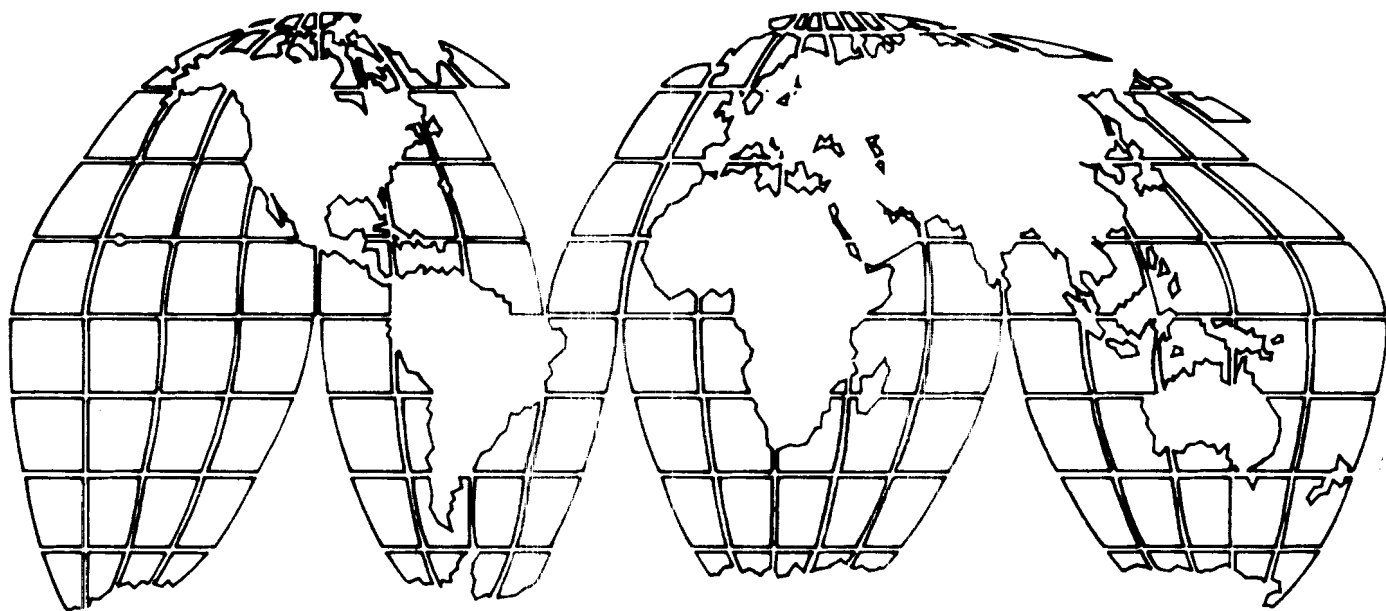


A.I.D. Program Evaluation Report No. 5

# **Rural Roads Evaluation Summary Report**

BEST AVAILABLE



March 1982

U.S. Agency for International Development (AID)

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RURAL ROADS EVALUATION SUMMARY REPORT

A.I.D. Program Evaluation Report No. 5

by

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U.S. Agency for International Development (AID)

March 1982

The views and interpretations expressed in this report are those of the authors and should not be attributed to the Agency for International Development.

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## PREFACE

This Rural Roads Evaluation Report culminates a three-year effort by the Agency for International Development (AID) to learn what works, what does not work, and why in the development of rural roads. The topic is one of several chosen for study because of executive requests and substantial AID activity. Investigation began in 1978, with the commissioning of a study by Judith Tendler on choice of technology and institutionalization issues in rural road construction and maintenance.<sup>1/</sup> In 1979, Devres, Inc. surveyed the literature on socio-economic and environmental impacts of rural road construction.<sup>2/</sup>

Fieldwork to study the socio-economic impacts of specific past AID rural roads projects took place from July 1979 through September 1980. Eight evaluations were conducted covering projects in Sierra Leone, Colombia, Liberia, Jamaica, the Philippines, Honduras, Thailand, and Kenya. Each of these reports has been published in AID's Impact Evaluation Report series. In June 1980, the Office of Evaluation of AID's Bureau for Program and Policy Coordination (PPC/E) began planning a conference of the impact evaluation teams, field officers, and AID/Washington (AID/W) personnel with responsibilities for rural roads. The conference was to combine the evidence of the impact evaluations with the experience of the other participants and to develop lessons for improving rural road projects. The Rural Roads Evaluation Conference took place November 11-14, 1980, with over 90 participants from 16 A.I.D. missions and host governments, AID/W, the World Bank, the Inter-American Development Bank, and other organizations. Appendix F provides some detail on the process of the conference, and Appendix G lists the participants.

One of the purposes of such a major effort in evaluation is to improve future projects through appropriate policy measures. Although this report does not establish AID policy, it does spell out the implications of evaluation findings for policy as well as for project design. Appendix A outlines key elements for a draft policy statement to guide AID support for rural roads development.


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<sup>1</sup> Tendler, Judith, AID Program Evaluation Discussion Paper No. 2.  
March 1979, "New Directions Rural Roads."

<sup>2</sup> Devres, Inc., AID Program Evaluation Discussion Paper No. 7,  
"Socio-Economic and Environmental Impacts of Low-Volume Rural  
Roads -- A Review of the Literature."

This report and the work that preceded it represent substantial efforts of many individuals both overseas and in AID/W. Their sustained interest will continue to be necessary if the lessons summarized in the report are to influence the design of rural roads projects in ways that enable such projects to contribute fully and effectively to development.

AID welcomes comments on both the substance of the report and the format in which its findings and related materials are presented. Comments may be addressed to the Office of Evaluation, Bureau for Program and Policy Coordination, Room 3720, Agency for International Development, Washington, D.C. 20523.



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## SUMMARY

### Background

This report summarizes the results of a two-year effort to ascertain the effectiveness and impact of AID's rural road activities in order to improve future projects. The effort included background studies; eight impact evaluations in Asia, Africa, and Latin America; and a Rural Roads Evaluation Conference in November 1980.

The study of rural road activities began as part of impact evaluations in a number of areas such as rural electrification, agricultural research, village health delivery, as well as rural roads. The lack of a clear agency transport policy and growing rural road activity made this effort necessary. During the 1970's, funding of rural roads grew from about 4 percent to over 7 percent of AID's Development Assistance budget. The majority of that activity was and continues to be in Africa.

By the term "rural roads" we mean roads other than primary or secondary highways in developing countries. We use a functional classification of rural roads and refer to rural local roads, rural collector roads, and rural arterial roads. Rural local and rural collector roads are short, narrow, and usually carry between 5 and 50 vehicles per day. Local roads provide direct access from farms to small villages, while collector roads connect villages to small towns with local markets and basic services. Rural arterial roads are wider, longer, and carry more traffic, especially heavier vehicles such as trucks hauling freight. This type of rural road connects small towns to primary and secondary highways and larger towns that offer more extensive services.

Other terms that require definition are project effectiveness and project impact. We judge effectiveness in two ways: first, by the actual length of road constructed, cost, and time required compared to projections and second, by the degree of sustainability of project activities, that is, maintenance and continued rural road construction after AID disburses all project funds. We measure impact by the degree to which the project attains broader project purposes and goals (such as increased agricultural production and income or improved quality of rural life) as well as any other economic, social, political, or environmental effects of the project whether or not these effects are intended.

### Effectiveness

In general, evaluation teams found that although rural road projects resulted in the construction of roads that were still in use, the designs of many projects suffered from overly optimistic estimates of



benefits, costs, and completion time. Inadequate engineering preparation also led to cost and time over-runs. Although AID improved its ability to plan road projects with satisfactory overall economic returns, economic and social analysis and justification of projects often overlooked agricultural price policies, land tenure problems, weakness of the transport industry, absence of complementary agricultural services, and other critical factors. Faulty economic analysis assumed that maintenance would occur where it was unlikely or resulted in paved roads where gravel surfaces would have sufficed. In four cases projects envisioned major use of labor-based construction, but this technology was used in only two cases. This resulted from a number of non-economic biases in AID and in host country institutions.

In the majority of cases, teams found that maintenance was neglected because of both donor and host country policies. Developing countries could more easily obtain aid for road construction or rehabilitation than for maintenance and therefore let roads deteriorate until rehabilitation was necessary. The engineers who ran highway departments, moreover, were more attached to roadbuilding, with its greater prestige, than to maintenance. Aid donors did not often act together in requiring progress in rural road maintenance before funding further construction.

As for the sustainability of projects, whether rural road construction or maintenance, the teams found only one clear success: the Accelerated Rural Development Program in Thailand. Some success in building local, provincial, or national capacity to carry on projects did occur in four other cases: Kenya, the Philippines, Jamaica, and Colombia.

Effective Rural Road Projects. Although each developing country is unique, we can begin to derive from the research several characteristics of more effective rural road projects. The project should be carried out by an institution whose principal mission is the construction and maintenance of lower volume rural roads. The project should include measures for strengthening the capacity of the institution and its staff in construction and maintenance. The organization and its road activities should be decentralized to provincial and local levels. Local village involvement in route selection, construction, and maintenance should be substantial. Local participation occurs more easily through the use of improved labor-based construction and maintenance.

There are several advantages in using decentralized, labor-based construction. First, it permits the construction of more rural roads for the dollars available where labor costs are low. It can be carried out on more sites than equipment-based construction. Since host governments are unlikely to allow heavy equipment to be used for long in rural road construction after AID funds are disbursed, labor-based construction offers the possibility of more sustained rural road construction. Second, decentralization, broad participation, and use of labor-based techniques build the capacity of the host country's bureaucracy and society to continue constructing and maintaining rural roads after AID funding ends. At provincial and local

levels, villagers and local officials become involved and begin to lobby for maintenance and continued construction. The enhancement of rural access by better roads gives poor, rural people more opportunities to obtain medical care, educate their children, and lobby for more services. Substantial involvement in route selection and construction can be a catalyst for enabling poor communities to organize themselves to obtain more services and protect their interests.

### Impact

The Project Papers for all the cases studied cited increased agricultural production as a principal purpose of the project. Production would go up, it was thought, because better roads enable farmers to expand the cultivated area or increase yields by obtaining more extension advice, improved seeds and fertilizer at lower costs, and better prices for their produce.

Most evaluation teams found that new road construction was associated with greater increases in agricultural production than was road upgrading. These increases were usually in non-food, export crops. Some cases showed expanded use of agricultural credit and large increases in land values. Teams generally found shifts in point of sale from the farm to roadside or small towns, often resulting in better prices for farmers.

Roads usually led to the proliferation of small shops in towns and the expansion of rural markets along new or improved routes. The expansion of rural industry was less common and seemed to require an expanding economy and policies encouraging small-scale enterprise.

The more serious environmental effects associated with road construction by the Devres study and the impact evaluations were deforestation, soil erosion, and declining soil fertility (caused by shortened fallow periods).<sup>2</sup> Road construction was an indirect cause, since it encouraged more intensive and extensive cultivation. Only deforestation appeared in a majority of cases, but all three conditions appeared in three cases.

Rural roads provided easier access for rural people to existing medical services and education, but had little effect by themselves on the expansion of health and educational systems. The only negative health effects associated with rural roads were decreased food production in favor of cash crops (with possible effects on nutrition) and suggestions that road construction aided the spread of certain diseases.

<sup>2</sup> Devres, Inc., AID Program Evaluation Discussion Paper No. 7, "Socio-Economic and Environmental Impacts of Low-Volume Rural Roads--A Review of the Literature."

Rural people interviewed voiced almost unanimous approval of rural road construction as improving their lives, most often citing easier access to medical services. Other benefits included easier and faster travel to jobs, schools, recreation, and social activities; wider job opportunities; and increased agricultural incomes. Evaluation teams found the most enthusiastic approval of roads in Colombia and Kenya, where local people had been most involved in route selection and labor-based construction. In Colombia the evaluation team found that the broad participation of local people so strengthened local communities that several were vigorously lobbying state governments for additional services, such as electrification, schools, and potable water.

The Devres study and the impact evaluations found that although the poor benefited significantly from rural road construction, the well-off benefited proportionately more because roads tended to reinforce existing development patterns. This was true unless other measures were taken to shift benefits to the poor. The two projects where the poor clearly received more benefits than the well-off (Colombia and Honduras II) were limited to areas where mainly poor people lived.

New or improved roads seemed to increase competition for land, and land prices rose. In several cases, poorer farmers were displaced or threatened with displacement. Women did not seem to enjoy great improvement in their lives after road construction apart from increased mobility. In some cases in Africa, road construction accelerated male migration and made women's lives more difficult because they had to provide for their children by themselves.

### Follow Through

Evaluations of rural road projects do not ensure that future roads will be improved. A number of individuals and offices within AID must act to disseminate and use the major findings. Some steps have been taken, but others are needed.

The November 1980 Rural Roads Evaluation Conference recommended that the AID Administrator issue a rural roads draft policy statement reflecting the major lessons and unsolved controversies of rural roads experience. The conference also suggested that a Transport and Rural Roads Working Group be established to help follow through on major recommendations. As of this writing, the Working Group is functioning and the draft policy statement is in final clearance. (See Appendix A of this report.) In addition, the present synthesis of findings from the impact evaluations and the conference has been prepared for wide distribution.

But these steps are only preliminary. Follow through requires a continuing effort to disseminate the findings and to see that they are used in new projects. Because of the emphasis in the Agency on designing projects and obligating funds, there is always the danger that these new insights will be seen more as obstacles to getting things done than as tools for improving AID's programs.

## Recommendations

AID should improve (but not complicate or lengthen) the project design process by better preparation of project design teams. This can be done by providing the time and setting for individuals of different specialties to become an interdisciplinary team before beginning design work. AID should also identify improved and more rapid economic, social, and engineering techniques for project appraisal and route selection. In their road project designs, missions should take into account weaknesses in primary and secondary road networks. Missions should carry out any required transport sector analysis as part of preparation for Country Development Strategy Statements (CDSS).

The AID Administrator and regional bureau chiefs should insist on the submission of more realistic cost, construction time, and benefit estimates. This requires that project review committees judge the objectives and estimated costs of Project Identification Documents (PID) and Project Papers (PP) on the basis of experience rather than by referring to other designs.

To ensure more maintenance of rural roads, AID should support the development of greater institutional capacity for maintenance, with attention to decentralized systems that emphasize local involvement. AID should seek the agreement of other donors in tying additional construction funds to tangible commitments to maintenance.

Higher priority should be given to rural road projects where the following exist: the transport industry can provide expanded service at lower prices, price policies and agricultural services encourage farmers to produce more, and the marketing and storage facilities can handle increased volume.

Rural road projects should include measures to avoid or reduce negative environmental effects such as deforestation, erosion, and declining soil fertility.

The Transport and Rural Roads Working Group should communicate the rural road evaluation findings to AID/W and field missions through travelling seminars. The Working Group should present major rural road findings to mission directors and design conference, as well as to PID and PP design teams before their departure.

The Working Group should also devise a "fast approval track" for new rural road projects that make use of the principal evaluation findings. Such a "track" could cut in half the time required for project approval.

The Working Group should monitor how well rural road projects use the lessons learned and propose rewards for missions, bureaus, and individuals who use evaluation findings more effectively.<sup>3</sup> As a first step, the Agency could require design officers and their teams to participate in a workshop on major rural road evaluation findings before preparing PIDs and PPs. PIDs and PPs that did not reflect evaluation findings would be returned to missions for revisions. Those that incorporated the evaluation findings would move onto the "fast approval track."

Finally, to ensure that AID continues to update its learning in the rural roads area, the Working Group and PPC should identify the best rural road evaluations each fiscal year. They should disseminate the new findings through a regular bulletin and see that the individuals responsible for these evaluations receive outstanding PERs, awards, promotions, or other suitable rewards.

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PPC could assist the Working Group in determining the best users of evaluation lessons.

## ACKNOWLEDGEMENTS

A large number of individuals have contributed to this effort. Although it is not possible to mention all those who assisted us, we will attempt to name those who made major contributions.

The rural road impact evaluation team leaders and team members provided the essential material for this report. We especially thank the Agency for International Development (AID) employees who participated and who added the burdensome task of managing the studies and writing the reports to their already full schedules. The evaluation team leaders were G.R. Van Raalte (Asia Bureau/Office of Project Development), Richard Cobb (Development Studies Program), Robert J. Berg (Bureau for Program and Policy Coordination/Office of Evaluation), Irwin A. Levy (Bureau for Latin America and Caribbean/Office of Development Resources), John M. Hamilton (Asia Bureau/Office of Project Development), Frank Moore (Africa Bureau/Office of Development Resources), and John Roberts (Asia Bureau/Office of Technical Resources). Appendix G lists the other members of the evaluation teams.

In most cases, AID missions in Sierra Leone, Colombia, Liberia, Jamaica, the Philippines, Honduras, Thailand, and Kenya welcomed the teams and provided generous support for their work; without this assistance the studies would have been much more difficult and much less useful.

The Rural Roads Evaluation Conference participants (listed in Appendix G) worked enthusiastically and tirelessly in the two brief time available to produce important insights into how rural road and transport activities could be improved. The nine working group leaders were especially important in making the conference a success; Dalton Griffith (Associate Administrator/Africa Bureau), Charles Vandervoort (Department of Transportation), Emmy Simmons (Bureau for Program and Policy Coordination/Office of Policy Development and Program Review), Richard Rhoda (Near East/Office of Development Planning), Irwin A. Levy (Bureau for Latin America and Caribbean/Office of Development Resources), John Zedalis (Development Support Bureau, Engineering), Alver R. Roan (formerly ASIA/Development Planning), David Steinberg (Program and Policy Coordination/Office of Evaluation), and Anthony Tummarello (Africa/Office of Development Resources). In addition, Ian Temple Roberts, Hank Lewis, Jane Gouveia, Alice Shepherd, and others of The Coverdale Organization, Inc. contributed immeasurably to the planning, organizing, and carrying out of the conference.

In choosing the projects to be studied and in communicating with the field, the evaluation officers of the various regional bureaus were extremely helpful. We owe special thanks to Bernice A. Goldstein (Bureau for Latin America and the Caribbean/Office of Development Programs); Henry L. Miles and Frank Dimond (Bureau for Africa/Office of Development Planning); Barbara Pillsbury, Susan Holloran, and Maureen H. Norton (Bureau for Asia/Office of Development Planning); and Richard Rhoda (Bureau for Near East/Office of Development Planning).

For the two initial studies of rural road projects we must thank Keith L. Oberg, Alain Y. Dessaint, Beth A. Jackson, Dennis H. Wood, and Charlotte DeBruhl of Devres, Inc., and Judith Tendler. These preparatory studies set a high standard for the impact evaluation teams to match in their reports.

Special thanks must also go to former AID Administrator Douglas J. Bennet, Jr. for his initiation of the impact evaluations and for his support of the conference. Deputy AID Administrator Joseph C. Wheeler chaired the final session of the Rural Roads Evaluation Conference and by his presence, knowledge, and interest made clear to the participants that the major evaluation lessons in the rural roads areas should be heeded and acted upon.

Finally, we must also mention the staff of the Office of Evaluation of the Bureau for Program and Policy Coordination (PPC/E) who carried out the less interesting but no less critical tasks of supporting the impact evaluation teams and preparing for the rural roads conference. This involved countless hours of photocopying; typing and retyping reports, cables, memos, and other documents; and many other tasks that required much overtime. We would like to thank especially Sallie T. Alvin, Peggy A. Colbert, Sharon Isralow, Robin Y. Renrick-Galery, Rita A. Jan, Eleanor Loisel, and Sandra Malone. For their leadership, support, encouragement, and helpful comments on innumerable drafts we thank Richard N. Blue, AID Associate Assistant Administrator for Evaluation; Robert J. Berg, Special Assistant Office of Evaluation; and the rest of the staff of the Office of Evaluation. We would like to thank Terrance Walbert, who did the final editing of the report and significantly improved the organization, prose, and content.

A final word must be said regarding the material of this report. Any errors of fact or omission are the responsibility of the authors alone and not of those mentioned above.

## GLOSSARY

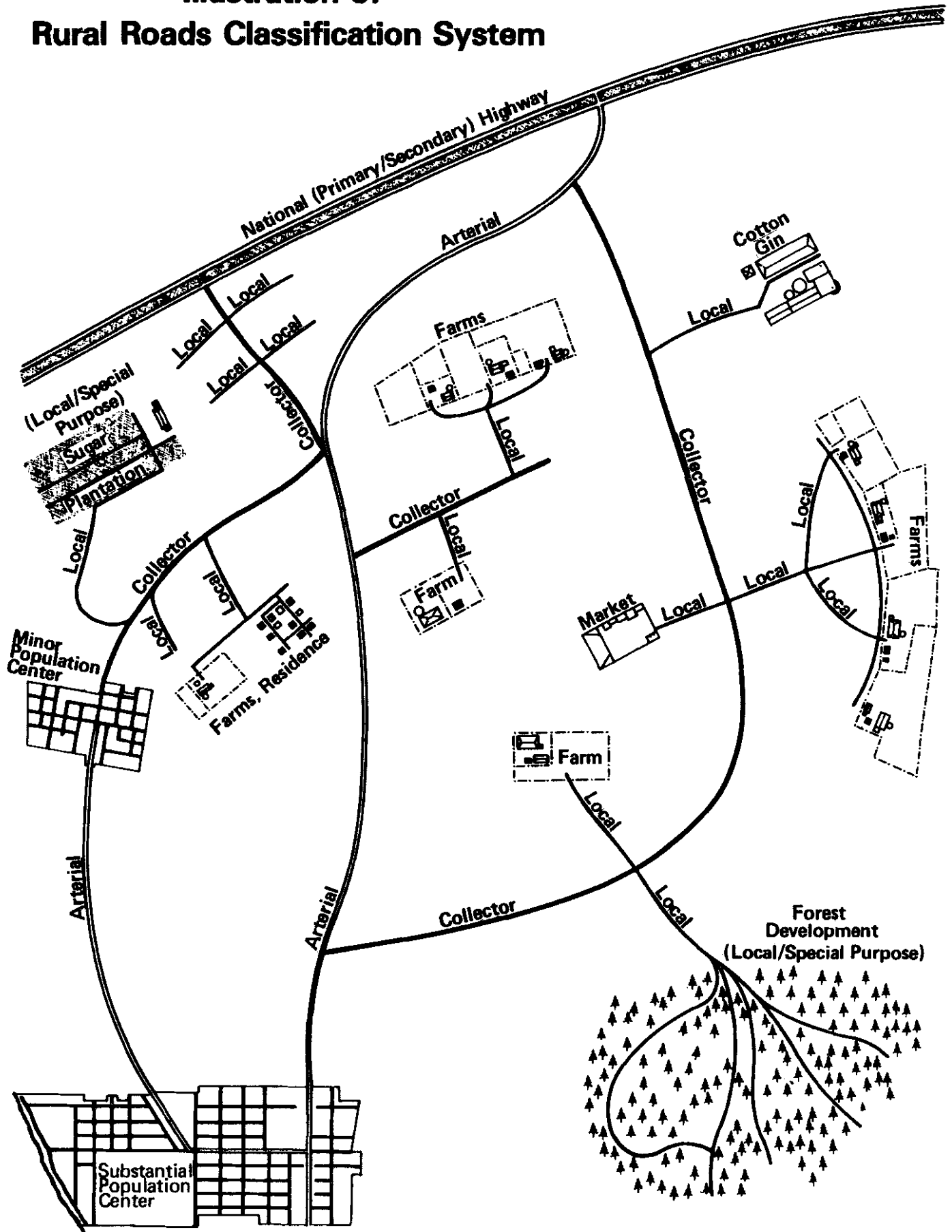
ABS	Annual Budget Submission; document submitted annually by AID missions outlining in detail their program plans and operating expenses for the coming year.
AFR	Africa Bureau in AID.
AID/W	AID offices in Washington, D.C.
CDSS	Country Development Strategy Statement; a five-year planning document outlining AID's strategy for development assistance in a particular country.
CP	Congressional Presentation; material that AID submits annually to Congress to justify its budget request.
DSB	Development Support Bureau in AID; provides technical support to AID regional bureaus and missions in areas such as rural development, health, and education. Renamed the Science and Technology Bureau (S&T) in 1981.
Effectiveness	A measure of the success of AID development projects. Judged by the degree of fulfillment of planned outputs (length of road constructed, cost, time required) and the degree of sustainability of project activities after AID funds are disbursed.
Force account	Use of government agencies and employees to carry out road construction, as opposed to use of private contractors.
Impact	A measure of the success of AID development projects. Measured by the degree to which broader project purposes and goals such as increased agricultural production and income or improved quality of rural life are attained, as well as any other economic, social, political, or environmental effects of the project whether or not these effects were intended.
Labor-based construction	A term developed by the World Bank under its research on the substitution of labor and capital in civil construction. The term refers to the use of relatively more labor in combination with improved hand tools, animal



carts, and intermediate mechanized equipment in road construction, as opposed to equipment-based construction.

LAC	Latin America and the Caribbean Bureau in AID.
LDC	Less developed country.
NE	Near East Bureau in AID.
New roads, or penetration roads	Roads made passable for motorized traffic where no such road existed previously.
PER	Personnel Evaluation Report; the annual rating that each AID employee receives on the quality of work.
PID	Project Identification Document; the first stage in AID project documentation.
PP	Project Paper, the second and final stage in AID project documentation.
PPC	AID's Bureau for Program and Policy Coordination. PPC sets and carries out overall agency policy, budgeting, and evaluation.
Rural arterial roads	Roads connecting small towns to primary and secondary highway systems that lead to major cities.
Rural collector roads	Roads that provide direct access by motorized vehicles from villages or rural areas to small towns containing local markets and the most basic public and private services.
Rural local roads	Roads that provide access from several farms to a small village or a rural collector road. These roads may be special purpose, such as tea or sugar roads.
TDY	Temporary Duty, trips made by AID personnel to carry out brief assignments in developing countries.
Upgrading	Improving a motorable dry-season road so motor vehicles can use it in the rainy season.

## Illustration of Rural Roads Classification System



## I. INTRODUCTION

### A. Background

Throughout its history AID has been involved in rural road construction, maintenance, and rehabilitation. This report summarizes the results of a two-year effort to learn the impact of this involvement. This effort included background studies and eight rural road impact evaluations in Latin America, Africa, and Asia (listed in Table 1). These studies were part of a series of evaluations requested by the AID Administrator in October 1979. To benefit from the knowledge and experience both inside and outside the Agency, a Rural Roads Evaluation Conference was held in November 1980. Participants from around the world represented AID, host countries, and other donors. Using the impact evaluations as a central body of evidence, the participants sought lines for improving the design and impact of rural road

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Prior to these evaluations AID provided only limited guidance on transport policy. The 1978 supplement to Handbook 1, "AID Policy on Food and Agriculture," supported rural road construction that increased "agricultural production and the incomes of poor farmers." At that time production projects were heavily encouraged and infrastructure projects discouraged. Yet it was still recognized that inadequate roads were a constraint to production because people, goods, and services could not move without adequate transport systems. The Foreign Assistance Act (1980) authorized the construction of "farm-to-market" roads "to increase the productivity and income of the rural poor."<sup>4</sup> An airgram including "Program Guidance for FY 1980" interpreted this as "permitting development of rural physical infrastructure that may be crucial to improvement of the material well-being of the rural poor." (Emphasis added.)

Just what constitutes "crucial" or an "adequate transport system" was not defined. How do we decide when and where to build roads to do the most for the rural poor? How many roads of what kind are really needed? At what point do we reach or surpass what is "crucial to the material well-being of the poor?" And how do we fit the type of road to the types of transport available?

Present policy does not go far toward answering these questions except to offer one further piece of advice: use labor-based methods to build roads. A 1972 supplement to Handbook 1 endorsed labor-based methods because they "can contribute to the creation of useful infrastructure as well as provide employment." This is reiterated in

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<sup>4</sup> Section 103(b) (1).

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Table 1. Rural Roads/Rural Components Projects

Evaluated July 1979 - September 1980

<u>Country</u>	<u>No.</u>	<u>Name</u>	<u>Year Completed</u>	<u>Dollars Obligated (Millions)</u>
<u>LATIN AMERICA</u>				
Honduras I	522-0070	Farm to Market Acces	1975	5.2
Honduras II	522-0100	Ag Sector I (road component)	1980	1.8
Jamaica	532-0035	Rural Feeder Roads	1977	10.0
Colombia	514-0194	Small Farmer Market Access (Pico y Pala)	1979	5.0
<u>AFRICA</u>				
Sierra Leone	632-0101	Rural Penetration Roads	1977	1.2
	632-0111	Rural Penetration Roads	1980	3.9
Liberia	669-0081	Rural Access Roads I	1975	1.0
	669-0116	Rural Access Roads II	1979	3.6
Kenya	615-0147	Vihiga Rural Development (road component)	1978	0.4
	615-0168	Rural Road Systems	1984	13.4
<u>ASIA</u>				
Philippines	492-0272	Rural Roads I	1979	15.0
	492-0297	Rural Roads II	1982	34.1
Thailand	493-0163	Accelerated Rural Development (road component)	1977	64.6*
Total				<u>159.2</u>

\*Figure represents total value of project, not just road component.

"Program Guidance for FY 1980," which also mentions that "knowledge about application of labor-intensive technologies (for rural roads) has grown very significantly" in recent years.

AID's roadbuilding experience is increasing and will continue to increase into the future. Although the average project cost from 1972-81 decreased in constant dollars, the total resources allocated to rural road activities increased substantially. Average annual rural road funding grew from 4.2 percent of Development Assistance in 1974 to 7.3 percent in 1980. Africa continues to have the most rural road activity measured by total funding and number of projects.<sup>5</sup>

## B. Definitions

Before discussing the evaluation results we should explain project effectiveness, project impact, access, new road construction, upgrading, and the functional classification of rural roads.<sup>6</sup>

The teams evaluated and analyzed the effectiveness and impact of rural road projects. They judged effectiveness by the degree of fulfillment of planned outputs (length of road constructed, cost, and time required) and the degree of sustainability of project activities after AID funds were disbursed. Sustainability usually required growth of institutional capacity. Project impact was the degree to which broader project purposes and goals were attained. These broader gains included increased agricultural production and income, improved quality of rural life, and any other economic, social, political, or environmental effects of the project whether or not these effects were intended.

The immediate effect of rural road projects is to improve access by reducing transport costs, travel time, and effort. For areas that generate sufficient transport demand to justify motor vehicles, construction of penetration or new roads reduces transport cost by enabling users to switch from slow and expensive animals or headloading to faster and cheaper motor vehicles.<sup>7</sup> In low-potential areas that do not generate sufficient demand to justify motorized transport, the

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<sup>5</sup> Tables 1 and 2 in Appendix B give more details concerning funding of rural road activities by year and by region.

<sup>6</sup> Some additional discussion of definitions and classification is included in Appendix C.

<sup>7</sup> Contrary to what one might think, animal or human transport is not free. Studies that have included the many cost elements that are usually not quantified for pack animals and human porters have demonstrated convincingly that the per ton-km costs of animal and human transport are many times higher than the transport costs of motor vehicles, provided that there is a motorable road.

construction or upgrading of new trails for bicycles, carts, and other non-motorized vehicles drastically reduces transport costs.

Many rural road projects involve upgrading, i.e., improving a motorable dry-season road to enable motor vehicles to use it in the rainy season. Upgrading does not lower transport costs per trip as much as construction of new roads because the change from animal to motor vehicle transport has already taken place. Upgrading simply reduces various motor vehicle operating costs. The benefits of upgrading can be quite significant, however, as traffic volume grows.

The functional classification of roads was the most useful for our purposes. The studies categorized roads as rural arterial (or connector roads), rural collector (or feeder roads), and rural local roads (or access roads/special purpose roads):<sup>8</sup>

#### Rural arterial roads

- connect centers of substantial population and economic activity;
- connect with and collect traffic from roads of lesser importance;
- are generally a part of an integrated network carrying larger traffic volumes of all types (trucks, buses) over relatively long distances and connecting with roads of equal importance or the "national primary/secondary" routes;
- carry both local traffic and through traffic.

#### Rural collector roads

- collect traffic from local roads and channel it into the arterial system;
- serve minor population or economic centers;
- do not carry through traffic.

#### Rural local roads

- primarily for land service to single or small groups of farms, residences, and businesses;

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<sup>8</sup> This categorization of rural roads and related discussion was prepared by John Zedalis, Development Support/Engineering, in the Spring of 1979 and is used here with thanks to him.

- carry a low volume of traffic;
- may be special purpose roads, servicing a specific economic activity within a confined area (e.g., tea roads, coffee roads, forest development roads, sugar roads).

Rural collector and rural local roads provide direct access by motor vehicles from farms and very small villages to small towns containing local markets and the most basic public and private services. These services may include health technicians; policemen; agricultural extension agents; shops stocking basic staple foods, farm tools, and simple medicines; and transport to larger population or economic centers. These roads are short (less than 20 km on the average), narrow, normally surfaced with gravel or laterite, and usually carry between 5 and 50 light vehicles per day.

Rural arterial roads connect small towns to primary and secondary highways that lead to major cities. These roads provide access to more extensive public and private services, e.g., public transport, storage facilities for crops, doctors and small hospitals, municipal judges, sources of government credit, larger shops with more luxurious consumer goods, and machinery parts and repairs facilities. These roads can carry considerable traffic (sometimes more than 1,000 vehicles per day), in which case they are invariably paved. In some cases, however, arterial roads are unpaved, narrow, and carry low volumes of traffic. These arterials are distinguished from collector and local roads only by the heavier vehicles they accommodate.

Table 2 indicates the types of roads involved in this evaluation.

Table 2: Type of Roads in Evaluated Projects

A. Type of Road by Functional Classification

<u>Road Classification</u>	<u>Sierra Leone</u>	<u>Colombia</u>	<u>Liberia</u>	<u>Jamaica</u>	<u>Honduras I</u>	<u>Honduras II</u>	<u>Philippines</u>	<u>Thailand</u>	<u>Kenya</u>
rural local		X		X		X	X	X	X
rural collector	X	X		X		X	X	X	X
rural arterial	X		X	X	X	X	X	X	X
primary/secondary highway system			X					X	

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B. Penetration or New Roads vs. Upgrading

new roads	mostly	70%	mostly	mostly	mostly	mostly
upgraded roads	mostly	30%	mostly	mostly	mostly	mostly



## II. IMPACT EVALUATIONS

This section discusses the findings of the impact evaluations in the areas of effectiveness, economic impact, and social impact. It makes recommendations for improving AID rural road activities.

### A. Effectiveness

Effectiveness addresses questions of how well the roads were selected and engineered, whether they were built according to the standards in the Project Papers, whether they were built within the costs and schedules, and whether the institution-building objectives were achieved, i.e., the extent to which the host government was involved and strengthened in its capacity to plan and implement rural road construction projects.

#### 1. Road Selection

*Economic analysis of rural road projects was often inadequate because important alternatives were neglected and important constraints overlooked. Lack of rigorous analysis led to underestimation of costs. Where road selection was centralized, there was a tendency to specify uneconomically high design standards and to overemphasize primary roads at the expense of rural roads.*

There was considerable improvement in the past decade in selecting road projects that contributed to increased growth and agricultural production, and to equitable distribution of benefits. Roads were selected to serve areas with sufficient economic potential, although for various reasons the full potential of the area was often not realized. In many cases these areas had a sufficiently high population density in which small farmers predominated. The central and local governments were increasingly involved in selection, but much remained to be done. The evaluations identified several serious problem areas that required improvement.

Economic justification of road projects was inadequate. Formal analysis of costs and benefits was often omitted, or where done, was incomplete and wrong. Lack of analysis led to the omission of alternatives such as low-cost gravel roads instead of high-cost paved roads. Major constraints to the agricultural development of a rural area were overlooked. These constraints included rigid price policies and the overregulation of marketing and distribution systems (Kenya), inadequate transport services (Jamaica), poor connections to the primary and secondary road system (Honduras I), and lack of incentive for small farmers to increase production. The last instance resulted from

inadequate access to credit and technical assistance (several countries) or uncertain land tenure (Liberia).

The lack of rigorous analysis made it easy to underestimate costs. Part of the underestimation of costs, however, was due to inflation. Most of the road projects were implemented during a time of rapidly rising prices of energy and construction materials. But a larger part of the cost underestimation was due to overly optimistic expectations of the host government's efficiency in administering the construction work. Many months were lost in approving bids and qualifying contractors, and costly change orders were required to correct design weaknesses. Furthermore, for the many countries where maintenance was inadequate, the high cost of periodic rehabilitation of the project roads was not factored into the analysis. The weak economic justifications resulted in two types of waste. First, roads were built that reduced rather than increased economic growth and rural incomes. Second, projects that were overdesigned and too costly for the purpose served were justified. A good example was building an expensive cement road where a cheap gravel road would have sufficed.

Tendler found that in recipient countries a tendency to overdesign roads and overemphasize primary roads at the expense of rural roads was often a consequence of the centralization of planning. Placing the road selection decision at more local levels produced a higher ratio of unpaved to paved roads, and led to lower design standards more appropriate for the low traffic volumes encountered on rural roads.<sup>9</sup>

## 2. Engineering

*Time and manpower constraints imposed on project designers led to inadequate road engineering and poor supervision. The Agency gave inadequate attention to the institutional capabilities of the implementing agency, and often AID involvement in implementing the project was lacking.*

Engineering and supervision were inadequate for many of the projects, especially Liberia. In an attempt to keep design costs in that country low and advance the start date of construction because of political pressure, minimal engineering analysis and preparation were applied to relatively difficult road projects. In other countries rigid engineering standards were applied without regard to terrain, climate, and soils. The engineering and economic analyses were often not coordinated, and trade-offs among maintenance, construction, and user costs were not analyzed. Proper drainage, the crux of rural road design, was

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<sup>9</sup> Tendler, Judith, AID Program Evaluation Discussion Paper No. 2., March 1979, "New Directions Rural Roads," pp. 42-43.

often superficially investigated. Engineering preparation appeared to be improving, however, and the design standards of the labor-based roads constructed in Colombia and Kenya seemed appropriate.

Inadequate engineering caused significant cost and time overruns because of unexpected technical problems, such as unsurveyed marshy ground in Liberia. The many engineering change orders that resulted were often not processed efficiently by the inexperienced and understaffed implementing agency. Large time delays resulted, posing a hardship to small contractors who did not have the financial resources to survive work stoppages and long delays in payments. The most extreme example of a cost overrun was the Honduras I project where the average cost per kilometer increased from the planned \$9,750 to \$40,475. Liberia Rural Access Roads II had the largest schedule slippage. The loan was authorized in 1972, but construction did not start until 1975 and was still far from complete as of 1980.

### 3. Labor-based Techniques

*Labor-based construction of roads was often planned in project designs but often not implemented. The large amount of AID staff time required for preparation and implementation of labor-based projects and biases against labor-based methods within the Agency and the host government were the main obstacles. But where implemented, labor-based construction was a success.*

The projects in Kenya, Colombia, Sierra Leone, and Jamaica stressed the use of labor-based techniques, but these techniques were applied successfully only in Kenya and Colombia. The other projects lost sight of the objective of labor-based construction for various reasons. Most important was the inadequate attention paid during project preparation to the time and effort required to organize unskilled workers and find competent supervisors and administrators. Once it became apparent to the implementing agency that the original construction schedule could not accommodate the time and manpower requirements for organizing the labor-based work, equipment-based procedures were soon substituted. Another important reason for discarding labor-based methods during the design phase was the prevailing attitude against such practices within engineering departments of the host governments.

Tendler's findings were consistent with the above but listed additional obstacles to labor-based construction. Both donors and host governments viewed equipment-based methods as modern and labor-based methods as backward. Donor financing of the foreign exchange cost of road construction usually meant that the funds would be used to purchase equipment from the developed world. Another obstacle was the larger amount of staff time required for the labor-based project, at least for the initial period of transition to such techniques. Tendler also emphasized the need to decentralize road construction decision-making to

local levels, which have a greater affinity for labor-based construction than central engineering departments.<sup>10</sup>

#### 4. Local Contractors

*Unless careful attention is paid to the needs and capabilities of small contractors, encouraging their participation can lead to serious damage to a country's small contracting industry.*

Two of the projects (Liberia and Jamaica) had the development of small contractors as one of their objectives, but this was not achieved. On the contrary, the projects weakened the small contracting industry in both countries. Small contractors failed in Jamaica and Liberia because of inexperience and the inability to cope financially with the many schedule delays and slow payments from the government. The high rate of inflation also increased the contractors' financial burdens.

Ironically, the Honduras I project originally planned to use expatriate engineering firms, but insufficient interest forced a change to small domestic contractors. The latter performed well, and the local contracting industry in Honduras was strengthened because of the project. In Honduras the implementing agency was quite competent in administering the project, and the small contractors themselves appeared to have capable professionals and managers.

#### 5. Maintenance

*Adequate maintenance of the AID-financed roads was difficult to achieve because of the low priority assigned to maintenance by the recipient countries and inadequate domestic financing.*

In five cases (Colombia, Liberia, Jamaica, the Philippines, and Honduras II), maintenance of project roads was neglected.<sup>11</sup> Neither routine maintenance (clearing the road shoulders of grass and bush, filling potholes, clearing drains) nor periodic maintenance (grading the road, replacing lost gravel) was performed on a regular basis. All except the most recently constructed roads, those with very light traffic, and cement-paved roads were in bad condition. In the near future, unless proper maintenance commences, many of the roads examined will have to be rehabilitated at a cost close to the original construction cost.

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<sup>10</sup> Tendler, pp. 5, 43 ff.

<sup>11</sup> In two other cases (Kenya and Sierra Leone) it was unclear if maintenance would continue after AID funds were disbursed.

The impact evaluations viewed the principal problem as the central government's attitude toward maintenance. Capital budgets for construction were politically easier to obtain from aid donors than operating budgets for maintenance, which the LDC often had to supply from its own resources. Maintenance could be neglected by overdesign, such as paving roads with asphalt where gravel would do. Furthermore, developing countries had considerable success obtaining development loans for reconstructing roads that deteriorated because of lack of maintenance.

## 6. Institutionalization

*The central question was how to assist host countries in developing a rural road construction program that includes maintenance of the roads, carries on construction after AID funds are gone, and includes local participation in the decentralization of road selection and construction. Decentralization of the rural road construction process or the active involvement of local governments and communities was an essential ingredient of successful institutionalization.*

Two of the cases studied, Colombia and the Accelerated Rural Development (ARD) program in Thailand, met all three conditions. The provincially administered ARD has continued to build and maintain roads, although AID funds have been depleted for several years. There was a question, however, whether the ARD would be able to obtain funds from the government to replace its aging stock of AID-supplied equipment. In Colombia, villagers applied for and helped construct rural roads, creating local capacity for further development. In Kenya, Sierra Leone, and the Philippines it was uncertain if the institutions that carried out the project would be capable of maintaining the roads after the project ended.

Still, Thailand, Kenya, the Philippines, and Colombia represented the greatest success in the cases studied in building institutions. The projects were being successfully executed. Road maintenance continued in Thailand and Kenya after construction was finished. Local people enjoyed substantial benefits, although this may not be the case for the unfinished Kenya project unless special measures are undertaken to provide both agricultural and transport services and unless institutions that can continue rural road construction in the future are strengthened.

## B. Economic Impact

### 1. Transport Costs, Farmgate Prices, and Access

*If the transport industry was competitive, new roads resulted in larger reductions in transport prices, larger increases in farmgate*

*prices, and more improved access than did upgraded roads. And provided transport services were available, new roads led to more frequent visits to rural areas by the existing network of development workers than did upgraded roads. The increase in personal mobility of the rural population was also enhanced more by new roads.*

According to the impact evaluations and the Devres survey, when new roads made transport possible for the first time, the reduction in transport cost and travel time was very high.<sup>12</sup> Frequently, cost and time were reduced 60 to 90 percent. Journeys, once difficult and measured in hours, were reduced to quick vehicle trips measured in minutes. In Liberia transport prices for hauling zinc roofing material were reduced by a factor of 15. Upgraded roads did not result in such dramatic reductions. Nevertheless, upgrading projects were usually cheaper than new roads and, if traffic levels were high enough, could produce sufficient savings in gasoline, vehicle wear and tear, and better vehicle use.

The projects reviewed were evenly divided between new and upgrading projects. For the new roads the reduction in transport costs almost always resulted in a corresponding reduction in prices paid by the rural population for transport of their agricultural production and for personal travel. The reductions, though quite high, were not as large as they could have been because of imperfect competition in the transport industry. The rural population in Kenya, for example, did not benefit from the reduction in transport costs by nearly as much as the people in Colombia and the Philippines.

The division of roads between new construction and upgrading resolved an important issue on transport cost raised in the Devres survey: why were transport cost savings of road projects sometimes so minimal? The impact evaluations found that the existing physical deficiency of the old road was an important factor in determining the amount of transport savings. The road upgrading projects, which by definition only improved existing roads, did not generate large savings in per-vehicle operating costs, and therefore could not be expected to generate much of a transport cost savings.<sup>13</sup>

Though motorized transport was significantly cheaper than head-loading and transport by animal, the prices for motorized transport were often beyond the reach of the poor. This was especially true where motorized transport was poor and where lack of competition pushed prices well above costs. Passenger transport fares could vary between \$.04 and

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<sup>12</sup> Devres, p. 6.

<sup>13</sup> Devres, pp. 136-137. The impact evaluations also supported the Devres conclusion about the importance of the efficient performance of transport enterprises in lowering transport prices.

\$.20 per passenger mile. Since the wage rate for unskilled workers in the developing countries of Africa and Asia is about \$1 per day, the cost for a five-mile trip could absorb from 20 percent to 100 percent of a worker's daily income. For this reason the evaluation teams observed many pedestrians and the persistence of headloading along many of the newly-constructed AID roads.

Most new road projects resulted in substantial improvements in prices received by the farmer at the farmgate, or in increased profit if the farmer transported his production to the market himself. Farmers also paid lower prices for inputs, such as fertilizer and other chemicals, and often had more buyers of agricultural products coming to the farmgate. For the upgraded road projects there was often no measurable difference in the farmgate and input prices although in theory there would have been a slight difference in the farmers' favor.

The new roads also reduced passenger fares and, in most countries, increased travel to town by the rural population. But visits by agricultural extension workers and other government and private agents to the rural population did not increase automatically. The evaluations indicated expanded coverage only where these services had been available before the road project or where they were provided as part of the road package.

Provided the transport industry was competitive, constructing new roads in areas dominated by the rural poor increased the chances of raising the income of the rural poor and improving their welfare. If complementary services were offered, such as agricultural extension and credit, the poor could fully partake in the potential benefits offered by the road. However, it could not be concluded that new road projects should be built to the exclusion of upgrading projects.

## 2. Agricultural Production

*The new road projects were followed by substantial and sometimes dramatic increases in agricultural production, especially where agricultural extension, adequate land tenure policies, and transport services were available.*

The increases in production consisted mostly of more perishable crops, which could not be marketed before the increased access provided by the road projects, and a switch to cash crops, such as cocoa, oil palm, rubber, and coffee. In Liberia and Thailand more extensive cultivation was an important factor in the increased production.

Significant changes in farm technology were observed in Thailand and Honduras II. These changes consisted of increased use of fertilizer and other farm chemicals, institutional credit, new seed varieties and, especially in Thailand, the increased use of mechanized farm equipment.

Changes in technology on a smaller scale were also observed in Colombia, Sierra Leone, and along the new roads in the Philippines.

Agricultural extension, development of farm cooperatives, credit, and land reform helped increase agricultural production and were vital to the realization of the full potential of the new roads. However, the case of Colombia also illustrated that, where these services were partially available before the project, substantial increases in agricultural production could be expected from new roads that were not part of an integrated development project. This proposition was further supported by observations made in the Philippines and Liberia along new roads that were "pure" road projects.

For the upgraded road projects, increases in agricultural production were generally not perceptible.

The impact evaluations cleared up two issues identified in the Devres survey. The first was whether a road improvement by itself is a sufficient catalyst to increase agricultural production. The impact evaluations found that in several cases (Colombia, the new roads in the Philippines, and Liberia) the road construction without complementary investment raised production significantly. This did not imply that complementary investment was no longer necessary. In fact, the impact evaluations concluded that complementary investment increased production even more than was possible with the road alone.

The other question raised by Devres was what constraints other than lack of access block increases in production? The impact evaluations identified a number of other constraints under the categories of complementary services (agricultural extension, land reform, etc.) and the efficiency of the transport industry.

### 3. Agricultural Credit

*Improved access increased the use of agricultural credit only where credit was already available before the road project started or was made available through special government programs after the road was built.*

The Devres study found that the number of credit agents was usually inadequate for their assigned areas. They were likely to concentrate on farmers within easy access. Road improvements, therefore, should increase visits by credit agents and use of credit by farmers. The impact evaluations corroborated this to some degree. The evaluation teams found three important cases where increased use of credit by small farmers followed the construction of a new road. In Colombia the farmers mentioned that the new roads made it easier to visit the existing government agricultural credit facilities and that government agents found it easier to visit their applicants. In several villages the team found more farmers using more credit than before the road was



constructed. In Thailand, where improved access to credit was an important objective of the new road construction, the team found substantial expansion of commercial banking, greater than expected deposits by farmers, and growth in loan volume by as much as tenfold over a few years. In Honduras II, where credit was provided along with the road, farmers increased their use of credit. Except for isolated instances, upgraded road construction did not coincide with increased use of credit.

#### 4. Land Values and Land Tenure

*New rural roads generally led to increases in land values, with land nearest the road increasing in value the most. Where inadequate land tenure and service made it hard for small farmers to compete with the wealthier farmers and entrepreneurs, undesirable shifts in land ownership could be expected.*

The Devres report predicted that the construction of rural roads would lead to increased land values and competition for land. This was true for most of the impact evaluations. In five cases (Colombia, Sierra Leone, Liberia, Thailand, and Honduras I) sharp increases in land values occurred where new roads had been constructed. But in Thailand and Colombia increased land values did not lead to displacement of poor farmers, who had adequate title to their lands and were able to compete with large farmers for agricultural inputs and services. In Liberia and Sierra Leone displacement took place.<sup>14</sup> In Liberia many subsistence farmers lost traditional rights to land they had habitually farmed when outsiders and wealthy local residents bought land from the government. In the Philippines the team found indications of threats to tenants' rights to land after road construction.

Sometimes the negative effects of the road took several years to manifest themselves. Along one of the roads in Honduras I, a sugar mill was constructed several years later. The increased cane production benefited mostly the larger farmers. The smaller farmers were unable to compete with them because of lack of support for basic grains and small-farm cash crops. The evaluation team found that a lack of services for small farmers could lead to a growing concentration of land ownership.

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<sup>14</sup> Although the original evaluation identified no land tenure changes in Sierra Leone, the Rural Roads Evaluation Conference learned that changes in tenure associated with road construction were appearing in the Northern Integrated Agricultural Development Project area.

## 5. Marketing and Distribution Patterns

*To provide farmers with improved access to markets, more than rural road construction was usually necessary. Also needed were a marketing system that could handle increased production, price incentives, complementary services and inputs, and a transport industry that could respond with more and better service at lower prices.*

Easier access to markets provided by rural road construction and, to some degree, road improvement helped farmers obtain better prices. The point of sale for many farmers shifted from farms to towns, markets, road junctions, and roadsides in Thailand, the Philippines, Colombia, Liberia, Honduras II, and to some degree in Sierra Leone.<sup>15</sup> Also, more buyers began to visit farmers and buy their crops, in some cases competing with each other (Honduras II, Colombia, Liberia, the Philippines, and in a very limited way in Kenya and Sierra Leone).

The appearance of more buyers could work in favor of the farmer. On the other hand, rural buyers could also cheat farmers, as in Liberia, Thailand, and Sierra Leone. Other less frequent changes in marketing patterns included development of new markets (Liberia and Sierra Leone), new storage facilities along roads to collect produce for truck pick-up and to sell inputs to farmers (Colombia), and purchase by villagers of vehicles to haul produce to towns for sale and to bring back consumer goods (Thailand).

These marketing changes occurred partly because of improved access and usually resulted in lower transport prices, more frequent service, time saving, and better price information for farmers. The improved access also enabled many farmers to switch to more perishable and higher value crops. But in most cases complementary agricultural services, a healthy marketing system, and adequate price incentives were necessary for increased production, better transport, and new marketing patterns to develop. It is also possible that in Thailand, Colombia, and the Philippines the greater government capacity to provide services enables the marketing changes to occur. In these countries the marketing system was healthy and prices were not overregulated. Improved access provided by the roads led to both increased visits by farmers to local markets and increased visits to the farmgate by buyers.

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<sup>15</sup> The Devres report claimed that the distance between farm and market had an important influence on the extent to which middlemen were bypassed. For farms close to the market the farmers tended to market their crops themselves, while for distant farms, increased reliance was placed on middlemen. This finding could not be corroborated by the impact evaluations.

Little or no marketing changes occurred in Jamaica and Kenya. In Jamaica lack of rural roads was not a problem, but new production could not be sold because of basic flaws in the marketing system, lack of complementary inputs, and the need for land reform. In Kenya rigid price policies and the lack of agricultural services and inputs for poor farmers forestalled increased production, expansion of transport services, and shifts in marketing.

#### 6. Commerce, Agricultural Processing, and Rural Industry

*Only if combined with rising agricultural incomes and policies that supported small-scale commercial and industrial enterprises could rural road construction assist the growth of commerce and production benefiting poor people.*

The impact evaluations identified two types of commercial and industrial activity associated with road construction. The first was the proliferation of small shops and small-scale enterprises selling basic consumer goods and providing personal services. The second was the expansion of agricultural processing and rural industry such as rice, corn, and sugar mills; palm oil processing plants; canneries; and repair shops. The expansion of small shops and small-scale traders was relatively common. The only exceptions were Jamaica and Kenya. The growth of processing plants and rural industry, however, was only observed in the Philippines, Honduras I, and Thailand.

For non-farm commerce to expand, rural income had to rise, thus increasing demand for consumer goods and the produce of rural industry. If farmers and town dwellers could buy each other's goods, they would support each other's development. For road construction to promote increased commerce and rural industry, lower transport costs had to be passed on to producers and consumers on farms and in towns.

Of the seven cases where expansion of simple commercial activity was observed, most of the projects involved new and upgraded road construction. Sierra Leone showed some increased commercial activity on the upgraded roads built there. Of the three cases where rural industry expanded, Honduras I and Thailand involved only new road construction. The third case, the Philippines, included both types of construction, but mostly upgrading. In Honduras I and Thailand the roads were substantially older than in the other projects. This suggested that time as well as sustained agricultural growth was necessary for road construction to assist the growth of rural industry.

In Kenya and Jamaica little expansion in either commerce or production took place after road construction. In Kenya this resulted from the youth of the roads and rigid government price discrimination against country shops. Transport costs were much higher in rural areas than for stores in larger towns. Furthermore, fixed farm product prices and the

absence of complementary agricultural services to assist small farmers meant that rural incomes were not rising in the areas served by the AID roads. In Jamaica rural income was stagnant because the overall economy was declining. The upgraded roads were not really needed to improve farmers' access to market. The Jamaican government was unable to assist farmers with expanded agricultural services or to fill the gaps in the marketing system, which at times left large quantities of produce to rot at roadsides or in the fields.

The Devres survey reported that improved road access had a deleterious impact on cottage industries because of the availability of cheap imports. This conclusion could not be supported by the impact evaluations. Though the demise of some cottage industries may have occurred, this loss would probably be offset by an equal gain to consumers, who could buy cheaper imports.

## 7. Environment

*The direct environmental impact of roads was generally modest, except for erosion and siltation of rivers. But the indirect environmental effects of roads were more serious. Rural road construction encouraged agricultural development, accelerating deforestation, declining soil fertility, and soil erosion.*

Examples of "direct effects" were erosion of hillsides where roads were built, siltation of rivers from this erosion, continuous dust in towns along the roads, flooding and erosion near outlets of drainage structures, and loss of fruit trees and agricultural land when a road right-of-way was cleared. Road construction in Colombia, Liberia, Jamaica, and the Philippines caused one or more of these direct environmental effects, but the magnitude was quite small. Only a few cases were found where farmland was damaged.

The indirect and more serious environmental effects were deforestation (five cases), shortened fallow periods leading to declining soil fertility (three cases), and erosion (three cases). A combination of deforestation, shortened fallow periods, and erosion occurred in Sierra Leone, Liberia, and Thailand. Roads built under Honduras I and in Kenya caused deforestation and increased cultivation. In Thailand flooding occurred in certain areas because of the inability of deforested hillsides to absorb heavy rains.

The basic cause of deforestation, declining fallow periods, and soil erosion was more extensive and intensive cultivation. Increased farming was assisted by roads but was also caused by agricultural price policies, expansion of agricultural services, increased input supplies and credit, and population growth. As more people moved to these areas, the land was continuously cropped. Land near the roads became scarce, and farmers moved up the hillsides, clearing the land of trees. With

more people the demand for fuelwood also increased and accelerated deforestation.

Intensified cultivation fulfilled a goal of rural road construction and could not be regarded as a purely negative effect. But the negative environmental costs had to be considered.

### C. Social Impact

#### 1. Who Benefits?

*Although the poor usually benefited significantly from rural road construction, the more influential and well-off usually benefited more because road construction reinforced existing development patterns. The disadvantaged enjoyed most of the benefits only where the roads served communities, most of whose inhabitants were poor, or where complementary services were available to the poor.*

In seven cases the poor benefited significantly from increased production of cash crops, easier access to medical and other social services as well as in other ways. But in five of these seven cases, the more prosperous farmers received a greater share of the project benefits. In Liberia poor farmers benefited significantly from increased cash crop production and small-scale commerce, but the well-to-do and influential improved their position even more. The latter bought the choice roadside plots, forcing poor farmers off and reaping the benefits of expanded commerce.<sup>16</sup>

One could argue that increased disposable income is more important to poor people than to the well-to-do because the poor are able to improve their diets, shelter, and other basic needs. Thus, the well-to-do garner more absolute benefits in dollar terms, but their advances are of less value to them. For example, \$100 in increased disposable income for a Kenyan farmer may amount to a 50 percent increase in his disposable income, whereas a \$1,000 increase for the owner of a trucking company may be only a 10 percent increase in his income and may not greatly affect the quality of his life. Nonetheless, the high percentage increase in income for the farmer does not mean that his life is 50 percent better, more secure, and healthier.

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<sup>16</sup> The Devres literature survey found that larger farmers were better able to take advantage of new inputs, more frequent extension agent visits, and newer technologies that roads helped bring to rural areas. See Devres, pp. 3,4,6,7.

The poor received the majority of project benefits from rural road construction in the Colombia and Honduras II projects because the roads reached communities where most of the people were poor. In Colombia and in Kenya significant numbers of the poor benefited from construction wages because of the labor-based construction methods used. In Honduras small farmers increased their production of cash crops and incomes because the roads were part of a package that included land reform, cooperatives, agricultural credit, and services.<sup>17</sup>

From the nine cases studied and the Devres literature survey, it seems that road construction usually benefits the well-off more than the poor unless one of two conditions is met. Either roads must benefit communities where most of the people are poor, or complementary agricultural and social services focused on the poor must be provided simultaneously with the roads.

If agricultural price policies provide no incentive for farmers to produce and if extension, credit, and marketing services are not available to encourage production, rural road construction is likely to do little for the poor, even if targeted on the poor as in Kenya.

## 2. Impact on Women

*The impact evaluations did not fully investigate the impact of rural road construction on women, but they provided useful insights. Because the roads reinforced existing development patterns, road projects reinforced existing disparities in income, role, and welfare between men and women unless other changes improved the status of women.*

The most common positive effect was increased mobility, noted in Colombia, Liberia, Thailand, the Philippines, and Jamaica. It led to increased marketing, better access to services, and even greater independence. In Liberia women who had difficulty obtaining a divorce in their local area could "simply take a taxi to Monrovia to get help from educated relatives and from the national judicial system."<sup>18</sup> Women's income and employment also increased in certain cases as a result of road construction and maintenance work (Kenya); cash cropping and

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<sup>17</sup> Tendler pointed out that labor-based rural road construction and maintenance benefits the rural poor in two ways: because of the employment generated, which is a short-term benefit, and because when the cost of labor-based construction and maintenance is lower than equipment-based methods, more mileage will be built or maintained. See Tendler, p. ix.

<sup>18</sup> Cobb, Richard et al., AID Program Impact Evaluation Report No. 6, June 1980, "Liberia: Rural Roads," p. 11.

expanded marketing and trading (Liberia); and vegetable production, jobs in towns, and employment with the road-building agency (Thailand). In Thailand the traditional woman's role as moneymaker and handler and provider of household resources to Buddhist monks was strengthened as a result of economic growth associated with rural road construction.<sup>19</sup>

Negative effects were noted only in Africa. In Liberia the migration of men encouraged by road construction meant that women from poor families often stayed behind and had more work to do to provide for their children. When land near new roads became scarce because of speculative land buying, such women from poor families were "among the first to be sent further up-country to make rice farms for their families." Consequently, they lost "the benefits of the roads--better medical care, marketing and educational opportunities."<sup>20</sup>

In Kenya, as elsewhere in Africa, road construction caused a shift to cash crops, placing more burden on women to provide food for their families. In some instances Kenyan women responded by working on the roads.

### 3. Social Services

*Rural roads did not necessarily lead to expanded or improved social services in rural communities. They only made it easier for rural people to reach clinics and schools and for health and educational personnel to reach villages. If existing services had been underutilized before the roads, they could reach more people after road construction. Otherwise, services in rural areas expanded only if road construction was part of a broader development effort or if roads enabled communities to increase lobbying with government officials for more services.*

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<sup>19</sup> The Devres survey found few studies examining the impacts of rural roads on women. Those reviewed indicated that road construction provided women with more opportunities and choices. See Devres, pp. 7, 113-117, 147-149.

<sup>20</sup> Cobb, p. 17. In Sierra Leone increased swamp-rice farming (encouraged by World Bank-funded integrated agricultural development projects, of which the AID-funded roads were a component) exposed women as well as men to more waterborne diseases. If women contracted diseases such as malaria or schistosomiasis, this could lead to more miscarriages and shorter spacing between births.

### Health and Nutrition

*Rural road construction enabled the inhabitants to reach health clinics and personnel more easily, but did not lead to the expansion of services in localities without increased government or other spending. Roads could also contribute to a decline in health and nutrition by promoting existing price incentives for non-food cash crops and thereby retarding food production, by aiding the spread of infectious diseases, and by reinforcing negative health effects of associated development projects.*

In health, the most common impact cited by beneficiaries was easier access out to health services. The only case where this was not mentioned was Sierra Leone. In only four projects, however, were new health facilities being built or visits by health workers more frequent. In Colombia, Honduras II, Thailand, and Kenya the teams discovered potential for improved nutrition, such as increased food production, high protein foods in stores, and a wider variety of crops. These phenomena were all related to lower transport costs, improved prices, or improved agricultural services provided in conjunction with the roads. In Kenya road construction facilitated farmers' use of cattle dips and visits to veterinary officers at the dips. Because of improved animal health, milk and cheese were more plentiful in the farmers' diets.

Higher food production was found in the cooperatives benefiting from access roads under the newer project in Honduras II. Yet, one of the four roads under Honduras I was associated with decreased food production because of a shift to cash cropping. A similar retarding influence on food production was suggested in Sierra Leone, Liberia, and Kenya.

The impact evaluation teams identified other negative health effects. The Thailand and Liberia teams noted that the roads could help spread infectious diseases, as with cholera in Thailand. In Sierra Leone and Liberia the roads were associated with increased exposure to waterborne diseases. In Sierra Leone the roads were major components of agricultural projects that encouraged swamp-rice production in order to shift the uplands from rice cropping to tree export crops. More time spent in small valley swamps meant more exposure to malaria, schistosomiasis, and other waterborne diseases. And the shift from upland rice led to the loss of nutritious crops formerly intercropped with upland rice and lower rice production as farmers shifted to more profitable export crops.



Rural road construction had both positive and negative effects on health and nutrition.<sup>21</sup> Most of the evaluations found that the positive effects outweighed the negative, but many of the negative effects identified developed more gradually and had potentially larger impacts.

### Education

*Rural roads enabled more children to attend classes more easily, and smaller, more isolated communities to retain teachers. In addition, rural roads were associated with more schools.*

In education the impact evaluations noted mainly positive impacts associated with road construction, at least in the short run.<sup>22</sup> In all cases teams found that after road construction more children were in school or that it was easier for them to get to school. In five cases it was easier to obtain and keep teachers, and in six cases more schools were built after road construction. Teachers were more willing to be assigned to rural localities with good roads because they could live at home or in larger towns and commute to work. The construction of more schools occurred when private voluntary organizations opened schools after the roads were completed (Sierra Leone), communities themselves built schools (Honduras II), or the government provided more schools (Honduras I and Thailand). In Colombia no new schools were built, but strong local involvement in road selection, construction, and maintenance led to community organizations that lobbied government officials for schools and health posts.<sup>23</sup> In Kenya the roads made it easier to import high-level government officials for self-help projects to build schools. Kenyan district educational officers also visited their schools more often on the better roads, enabling principals to argue their needs for more supplies, equipment, and teachers.

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<sup>21</sup> The findings were generally consistent with the Devres literature survey, which found similar reports of improved access to health services, shifts from food crops to cash crops, and spread of infectious or insect-borne diseases facilitated by road construction. See Devres, pp. 8, 86-91, 140-142.

<sup>22</sup> Devres' findings in education were less clear than those of the impact evaluations. Some studies found the same effects (more schools, retention of teachers, and higher enrollments), but others found little change. See Devres, pp. 8, 91-99, 142-143.

<sup>23</sup> Van Raalte, G. R. et al., AID Project Impact Evaluation Report No. 1, "Colombia: Small Farmer Market Access," p. 11.

#### 4. Migration

*A hypothesis developed from the literature states that rural arterial roads increase rural-to-urban migration, whereas rural collector and local roads do not because they strengthen local market towns as administrative and economic centers. It was unclear from the evaluations whether rural road construction by itself substantially increased rural-to-urban migration. But rural roads, in combination with other factors such as insecure land tenure, urban-oriented education, and urban-biased price and marketing policies, were likely to increase migration to the cities.*

In Liberia insecure land tenure and the roads combined to increase migration to urban, lumbering, and mining areas. The team found serious social implications as men left their families in search of jobs. The wives, children, and grandparents were often left to provide food for themselves and grow rice for urban relatives. Because of the land speculation caused by the roads, they were forced off fertile land near the roads and moved farther into the bush to find suitable farmland. In the Philippines the team noted instances where road construction increased commercial farming, which in turn threatened the tenure of small tenant farmers. In Sierra Leone improved roads were associated with increased educational activity, which in turn was connected with higher migration.

On the other hand, the Thailand roads encouraged migration of farmers to clear and cultivate new land. In both the Philippines and Colombia farmers returned to cultivate land they owned but had not been able to farm previously. The Jamaica project was intended to retard rural-to-urban migration by increasing employment in rural areas through road construction, increased agricultural production, and social services. But the project had no effect on migration because little employment was generated, and there was little increase in production. The use of the Kenyan rural access roads by rural people to commute to work in towns supported the hypothesis advanced by Devres that rural arterial roads increase migration, whereas rural collector and local roads discourage it by promoting the growth of market towns.<sup>24</sup>

#### 5. Perceived Quality of Life

*Rural people usually regarded roads as good in themselves because rural roads represented progress and provided certain visible benefits immediately. This belief held true even if significant benefits did not accompany the roads or if the harmful effects outweighed the positive effects. In fact, few people saw the connection between the roads and*

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<sup>24</sup> Devres, pp. 9, 101-106, 149-150.

*loss of land tenure or environmental destruction. Greater local involvement in selection of routes and labor-based construction and maintenance resulted in more enthusiastic approval and appreciation of the roads.*

Those living near the roads were generally positive, even enthusiastic, about the effects of the roads on their lives. Only in one case, Sierra Leone, was there no mention of a positive perception by beneficiaries. Those interviewed listed specific reasons why the roads had improved their lives. Except in Jamaica and Sierra Leone, the respondents mentioned the greater ease of getting to medical clinics and hospitals. This quick access to medical care was extremely important to their sense of well-being. Other specific benefits included faster and more comfortable travel to jobs, schools, and social activities; wider job opportunities; increased incomes; and better access to social services.

Rural people maintained their positive view even where the team found few positive benefits or even harmful effects from the roads, as in Liberia. In Liberia the roads accelerated land-buying, causing displacement of subsistence farmers from roadside land they had traditionally farmed. As men migrated in search of work, older people, women, and children often had to move back into the bush to find land to grow food. But the team found no one so affected who connected the roads with this social dislocation.

This favorable view of roads is easy to understand. Immediately after road construction come more visitors, new things to buy, broadened opportunities, more exciting weekly markets, and often, rising agricultural income. The harmful effects, such as accelerated deforestation and lower nutrition, often follow more slowly and are harder to connect to the roads. And roads symbolize development and progress to most people, as the Philippines team reported.<sup>25</sup>

Kenyans and Colombians were the most enthusiastic about the value of roads. In these two cases, road construction involved the most participation of local people in selection of routes and in labor-based construction and maintenance.

The only negative statements about the roads were in Honduras II and the older Vihiga roads in Kenya. In Honduras certain cooperative members complained that irrigation works had been of higher priority to them than a road, but that they had not been consulted. In the Vihiga district in Kenya the people were upset over the deterioration because of lack of maintenance of roads built several years earlier.

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<sup>25</sup> AID Project Impact Evaluation Report No. 18, "Rural Roads in the Philippines," January 1980, p. 12.

#### D. Other Key Issues

##### 1. Low- vs. High-Volume Roads

*The impact evaluations and the Devres survey found that low-volume local roads could be focused on the small farmer, who received the majority of the benefits of the rural road if the transport industry was competitive and if complementary services were available. The impact evaluations also found that small farmers were vitally dependent on high-volume primary and secondary roads. Without these high-volume roads, the small farmers were cut off from markets, ports, and inputs required for rural development and increased agricultural production. The rich also benefited significantly from such roads, but their benefits were not at the cost of the poor except in rare cases of extreme congestion.*

The magnitude and incidence of per capita benefits depended on the function of a road. Rural collector and local roads are quite short and carry low traffic volumes, usually between 10 and 50 vehicles per day. Because of low traffic volumes, these roads can be built to low design standards and can follow circuitous alignments or steep grades. These roads can be concentrated in areas more likely to be inhabited by small, relatively poor farmers. Both the Devres survey and the impact evaluations demonstrated that the benefits from these roads could be focused on small farmers, provided the transportation industry was reasonably competitive and complementary services were available.

But low-volume roads were not sufficient in themselves to promote development in rural areas. High-volume, rural arterial roads and secondary and primary roads were a vital link to the rest of the country. In Liberia the AID roads were isolated from the rest of the country during the rainy season because of the decrepit condition of the country's primary road system. Fuel, fertilizer, and other farm inputs could not be shipped into these areas from ports, nor could farm products be shipped out during a large part of the year.

Higher volume rural roads were also used directly by the low-income element of the population. In Jamaica and Liberia as much as 80 percent of personal travel on these roads was in public vehicles. Though there were no specific data on the income brackets of public transport users, it is reasonable to assume that their incomes were low.

The Devres survey hypothesized that higher volume rural roads were more likely to accelerate rural-to-urban migration than lower volume rural roads, but the impact evaluations could not confirm or deny this.

## 2. New Roads vs. Upgraded Roads

*New road construction could be justified economically at a much lower traffic volume than could upgrading. But upgrading could easily be justified, provided the traffic volume was high enough. Determining when the volume was high enough was a matter for economic analysis. Because of the large increase in access provided by new roads, the possibility was greater that the new roads would harm the rural poor through exploitation by outsiders and local elites, and by damage to the environment.*

A new rural road if properly planned, especially with regard to complementary services for farmers, could have a dramatic impact on agricultural production. An example was Thailand, where it was not unusual to find small farmers who had increased their production of cash crops tenfold within a ten-year period after a new road was constructed. The road made possible large reductions in transport prices when competitive motorized transport replaced non-motorized transport. In Liberia, for example, the price of transporting goods fell 90 percent after head-loading was replaced by trucks.

Another contribution of new roads was the farmers' improved access to essential inputs and services. In general, the impact evaluations found that when a new road replaced a foot trail, government agricultural extension agents, credit agents, and others providing agricultural services were more likely to visit small farmers along the new road. The improvement in access also dramatically increased the value of formerly "worthless" land. Unless land tenure was secure and the government actively supported small farmers, there was a tendency for the urban or local elites to exploit the farmers. Environmental damage, such as that caused by excessive harvesting of wood, could also follow.

Upgrading projects had much less impact on each individual farmer than the new roads. Vehicular traffic was possible on the road before upgrading, though the poor condition of the road made travel costly and difficult. Upgrading such a road did not result in a great improvement in access, though vehicular operating costs and travel times might be reduced as much as 30 percent.

Although the per capita impact of upgraded roads was smaller than that of new roads, AID should not avoid road upgrading projects. If the number of vehicles using the road is large enough, considerable savings may be generated by the upgrading project even though the incremental benefit to the individual farmer is small. The construction of a number of local or collector roads in an area may require the upgrading of a rural arterial road to handle the increased traffic.

### 3. Local Participation

*Involvement of local people in selection, construction, and maintenance of roads had several advantages. It laid the basis for road maintenance. Communities also found themselves better able to obtain more government services by forcing development programs to be more responsive to their needs. Local people began building more constructive relationships with higher levels of government and organized more effectively to protect their interests.*

In the three cases where projects included significant involvement of local people, the benefits were high. Colombian communities applied for road construction assistance and then carried out most of the construction themselves. In addition to higher farm incomes, the local people learned skills that they applied to improving their homes and farms. This community participation, both in applying for and in building the roads, "significantly strengthened internal stability and social organization."<sup>26</sup>

The Kenyan rural access roads involved local committees that proposed routes for construction in each district. Laborers selected from the local population by lottery then built each road using labor-based methods. Maintenance was labor-based and carried out by individual workers, both men and women, under contract and supervised by district field engineers. This system produced good quality roads at modest cost (\$8,400 per kilometer as of 1980).

CARE, the implementing agency in Sierra Leone, used mainly equipment-based methods but still involved local chiefs and hundreds of villagers in construction and maintenance tasks. Much of this labor was "voluntary," raising the question whether such participation was coerced to some degree by local chiefs. Even this limited degree of participation resulted in local identification with the roads.<sup>27</sup>

In the Philippines, Honduras I, and Liberia, broad participation did not occur, and the teams concluded that the projects would have been more successful with such local involvement. The Philippines and Honduras teams suggested that greater involvement of beneficiaries in the selection and construction of the roads would have meant the more satisfactory fulfillment of the communities' needs and increased

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<sup>26</sup> Van Raalte, p. 11.

<sup>27</sup> The Devres literature survey concluded that participation of local people helped resolve many social and economic issues and maximized desired impacts. See Devres, p. 152.

motivation for local maintenance.<sup>28</sup> The Liberia report suggested that the negative effect on land tenure and income distribution might have been diminished if more emphasis had been placed on strengthening village organizations and broadening local institutions. Such efforts might have enabled subsistence farmers to retain their land and small farmers to take more advantage of the opportunities offered by the roads.<sup>29</sup> Most evaluation teams that stressed the importance of local participation also indicated that labor-based construction was important in fully involving local people.

Effective local participation was also associated with constructive political development of communities. In Colombia several communities lobbied for schools, health posts, and electrification after completing their roads. In Honduras II, one community's perceived success in obtaining a road gave it confidence that it could effect other improvements. Because the roads reinforced existing distribution patterns in Liberia, lack of local involvement was partly responsible for increasing suffering and social tension.

#### E. Recommendations

##### 1. Effectiveness

##### a. Road Selection

-- AID should increase its in-house capability for economic appraisal of rural road projects and step up technical assistance and resident advisory services to host governments to improve their ability to plan such projects.

-- Appraisal of low-cost rural roads requires more efficient procedures that are less elaborate but still sufficiently accurate. For roads constructed using labor-based methods, the total cost of a full-scale economic appraisal of each road, using producer surplus methods, may be prohibitive. Simplified appraisal techniques must be developed.

-- Regional bureaus should encourage missions to estimate construction costs and timetables more realistically. Project review committees should judge prospective projects on the basis of past projects rather than recent designs whose estimates may be overly optimistic.

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<sup>28</sup> Tendler argued that decentralizing design and construction decision-making to the village level helps maintenance because the community, as opposed to a distant roads authority, is better able to see its self-interest in maintaining its road. See Tendler, p. 52.

<sup>29</sup> Cobb, p. 19.

b. Engineering

-- AID should increase in-house capability to prepare projects and to monitor the effectiveness of consultants, contractors, and force account from preliminary design through final construction.

-- AID should expand mission capability to solve unexpected problems and to substantially change a project's scope and design if necessary.

c. Labor-based Techniques

-- Missions should have more in-house capability for preparation and implementation of labor-based projects.

-- To encourage labor-based rural road construction in those countries where it is appropriate, AID should coordinate with donors to avoid funding both labor-based and equipment-based construction within the same implementing agency.

-- AID should decentralize rural road construction and planning in order to separate equipment-based and labor-based projects.

d. Local Contractors

-- AID projects should use more rigid pre-qualification standards for small, local contractors in order to eliminate those that do not have the professional skills, management ability, and financial resources to survive poorly administered road projects.

-- More attention should be given to improving the host government's capability to manage a project.

-- In countries where qualified local contractors are in short supply, AID should consider loans to inexperienced, small contractors to enhance their management capabilities and ease their cash flow problems.

e. Maintenance

-- AID should consider financing maintenance components in rural road projects or maintenance projects.



-- The Agency should also encourage the decentralization of maintenance by promoting involvement of local people in all aspects of maintenance work.

-- Assistance should be given to countries in raising revenue for maintenance through road-user charges.

-- AID should coordinate efforts with other donors to change the attitude of host governments toward maintenance, especially by encouraging them to deemphasize new construction in favor of maintenance.

f. Institutionalization

-- AID should try to include the following in future projects: institution-strengthening; implementation by an institution whose primary task is rural road planning and construction; and active participation by provincial, local, and community governments.

2. Economic Impact

a. Transport Costs, Farmgate Prices, and Access

-- During project preparation AID should verify that the transport industry is able to translate lower transport costs into lower prices and better service to the rural poor. This is possible only if the industry is competitive, adequately supplied with vehicles and repair shops, and not overly regulated.

-- AID should investigate whether non-motorized transport can lower the transport costs to the poor.

b. Agricultural Production

-- AID should encourage the construction of new roads without requiring them to be part of an "integrated" project in areas where the agricultural potential exists, where complementary services such as credit and technical advice are available, where the transport industry is able and willing to respond, and where lack of access is, therefore, the dominant bottleneck to increased agricultural production. These facts should be analyzed and verified in the feasibility study.

-- Where the agricultural potential exists but where complementary services are not available, new roads should be constructed only as part of a larger, integrated project.

-- Based on the evidence of the impact evaluations, it is unrealistic to expect substantial increases in agricultural production from upgrading projects. These projects will, therefore, have to be justified on other grounds such as savings in gasoline and tires, better use of vehicles, or as part of a set of interventions to increase agricultural production.

c. Agricultural Credit

No recommendations.

d. Land Values and Land Tenure

-- AID road project designers should ascertain that small farmers have secure title to their land and sufficient services to compete with large farmers.

-- To diffuse the impact on land values and transactions, AID should construct a network of trails rather than roads in problem areas.

e. Marketing and Distribution Patterns

-- AID should engage in new rural road construction or upgrading only where the following exist or can be set in motion: farm price policies give farmers strong incentives, the marketing system can handle more production, the government commits itself to expand complementary services and inputs to reach more farmers, and there is competition in the transport industry.

f. Commerce, Agricultural Processing, and Rural Industry

-- Where growth of commerce and industry is a principal goal, rural road construction should be limited to countries where price policies, complementary services, the marketing system, and the transport industry support agricultural production. Road construction should be carried out simultaneously with programs that assist the creation and growth of small commercial and manufacturing enterprises.

g. Environment

-- AID should construct new rural roads in hilly areas with population pressure only where there are policies that prevent the massive environmental dislocation that may occur.

-- AID should develop principles for determining when rural road construction in hilly, densely populated areas will so exacerbate deforestation, declining soil fertility, and erosion as to do more harm than good.

-- AID should include costs of avoiding negative environmental impacts when carrying out economic analysis of road projects or integrated agricultural development projects with rural road components. Typical costs would be reforestation and soil preservation.

3. Social Impact

a. Who Benefits?

-- AID should emphasize rural road construction in areas where most inhabitants are poor and where complementary agricultural and social services are sufficient to enable small producers to compete effectively with larger farmers.

-- AID should adopt as one principal measure of the success of rural road construction the fact that the relatively poor benefit proportionately more than the more affluent.

-- AID should determine in what circumstances rural road construction alone is sufficient for poor farmers to increase their share of production and income and in what circumstances complementary services are also necessary.

b. Impact on Women

-- AID should include complementary activities focused on women where rural road construction is a component of a larger development effort that may increase the disparities between men and women.

-- AID should combine road construction with price incentives and complementary services emphasizing food production in areas where there are large numbers of female-headed households.

-- AID should investigate the long-term effects of road construction on women's roles. The study should determine if increased mobility from better roads substantially improves the status of women and outweighs any harmful effects.

c. Social Services - Health Nutrition

-- Where rural roads are part of agricultural production programs, AID should ascertain before project approval that there exist adequate price incentives and agricultural services for food crops. The Agency should also determine likely health effects on the poor.

-- AID should study the effects of rural road construction on food production and nutrition in countries with strong incentives for non-food, export crops.

d. Social Services - Education

-- AID should determine whether the reorientation of rural education toward a more functional, rural focus will have more effect on retarding rural-to-urban migration than road construction and other factors have in accelerating it.

e. Migration

-- AID should determine whether construction of rural collector and local roads is associated with less rural-to-urban migration than construction of rural arterial roads.

-- AID should determine what factors in combination with rural road construction are more important in accelerating rural-to-urban migration. Possibilities include insecure land tenure, urban-oriented education, and urban-biased price and marketing policies.

f. Perceived Quality of Life

-- AID should take advantage of the extremely positive view rural people have about rural roads to involve them more in route selection and as paid construction and maintenance laborers.

-- AID should identify and weigh the possible harmful impacts of rural road construction on land tenure, migration, the environment, and income distribution before approving rural road projects.

4. Other Key Issues

a. Low- vs. High-Volume Roads

-- Before focusing on specific projects, AID should examine transport access for small farmers as part of a larger analysis of possible weaknesses of the primary and secondary roads in linking the region with the rest of the country.

b. New Roads vs. Upgraded Roads

-- AID should include both new and upgraded roads in its projects. The proportion of each type of road should be determined by economic and social analysis.

c. Local Participation

-- AID should encourage local participation in rural roads projects by using improved labor-based construction and maintenance methods where appropriate. Even where rural roads are built with equipment-based methods, the project should involve local officials and villagers in construction and maintenance tasks.

-- AID should continue impact studies of the Colombia, Kenya, and Sierra Leone projects, which had significant involvement of local people, and compare them with the impacts of the Philippines, Liberia, and Honduras projects.

### III. THE RURAL ROADS EVALUATION CONFERENCE WORKING GROUP REPORTS

The conference was held at Harper's Ferry, West Virginia on November 11-14, 1980. The participants were divided into working groups that corresponded to nine issue areas that had been identified in meetings with representatives from each AID bureau in the weeks before the conference.

Each working group was asked to identify the most important issue or issues in its area and submit recommendations and a plan for implementing those recommendations. Their target was to report their findings to Joseph Wheeler, AID's Deputy Administrator, on November 14, 1980. These reports are below. The groups also shared their thinking in plenary sessions at the end of each day. Appendix J presents some of the main threads of the dialogue.

#### A. Transport Policy

Issue: Should AID be involved in the transport sector?

Rural roads are perceived in various ways. Evaluation studies indicate that the affected people generally feel they make life easier. Host country governments usually categorize rural roads as priority projects. AID field missions, however, often express an ambivalent attitude. AID/W tends to question their priority and fit with the "New Directions," while some members of Congress question their appropriateness for US financing.

Transportation is a derived demand concomitant to an exchange economy and is a catalyst to development. Transport facilities do not create development but are necessary for development to occur. A nation's transport facilities must be viewed as a whole that includes all the various modes and related services such as management, storage, and maintenance. Without development of the transport sector there would be little development beyond subsistence agriculture.

AID assistance policy neither encourages nor precludes transport sector projects. There is, however, no functional account or financial category for transport sector activities. Under Development Assistance financing they must be justified in terms of agriculture and rural development; health, nutrition, and population; education; or as a special development problem. Under the Economic Support Fund transport activities should be supportive of these areas. To the extent that AID identifies increased food and agricultural production as a priority for US assistance efforts, transport sector activities can be justified in support of the Agency's primary goal.

Transport facilities are a critical part of the two-way transfer system by which urban areas supply farm areas with production inputs, consumer goods, credit, and other services and by which farmers supply urban areas with food and fiber. Farmers and urban dwellers are both producers and consumers. Goods, services, and capital flow between these groups with varying degrees of efficiency depending upon the nature of the items; the manner in which the transfers are managed; and the physical, economic, and political factors that influence the transfer system.

This two-way transfer system between producers and consumers is frequently one of the weakest parts of a developing country's agricultural sector, and one of the most amenable to change. The improvement of transfer systems is central to increased agricultural production. While transport facilities are viewed primarily as supportive of agricultural production, their long-term impact should benefit other sectors such as health and education, promote commerce and industrial growth, and have a positive effect on development.

Recommendation AID participation in transport sector activities should be encouraged under Section 103 of the Foreign Assistance Act where such activities can be related to increased agricultural production and rural development. Transport projects should be undertaken as part of larger assistance programs to improve agricultural interchange systems. Other inputs will probably be required at the national, regional, and local levels. An integrated analysis is necessary. In terms of AID's logical framework design system, one might view improved transport facilities as a project input, with the output as a more efficient rural-urban interchange system and the purpose as increased agricultural production. The priority of transport sector activities in rural development should be justified in the context of each country's development and derived through the CDSS process. A number of specific considerations must be addressed in the formulation of an Agency transport policy: selection, maintenance, institutionalization, labor-based technology, local participation, co-financing, equity, standards, and design and evaluation criteria.

The Agency should issue a general transportation policy determination along the lines proposed. Regional bureaus should be responsible for adapting this policy to the specific needs and priorities of the several regions. Field missions should be instructed by responsible Assistant Administrators on the new policy.

## **B. Transport Design Issues**

a. General Issues The impact evaluations, especially in Liberia and Jamaica, revealed that project designs were often weak. The cost and time overruns were always large, and in many cases the design standards were not based on adequate engineering and economic considerations. The

range of alternatives included was often too narrow. Compressed time schedules dictated by political constraints resulted in inadequate fieldwork and analysis, overly optimistic projections, and poorly coordinated team work. Little attention was paid to who the beneficiaries would be. Limitations in the host country's capability to implement the project were not understood. Non-motorized transport was not considered. And the Project Paper became a sales document rather than a management tool. These deficiencies were generally a consequence of inadequate direct-hire staff, insufficient time allowed for project preparation, and inefficiencies in disseminating state-of-the-art information on project design within AID.

#### Recommendations

- Ensure proper timing and adequate time for coordinating design team inputs. The project design officer should be allowed adequate time and staff for planning the project paper.
- Strengthen AID in-house capabilities in rural roads project preparation. AID/W, Development Support/Engineering, Personnel Management/Training Division, and PPC should initiate on-site training of AID staff in designing rural roads projects. There should be more intensive dissemination of specialized manuals such as the training manual on labor-intensive operations prepared by the Haiti mission and the forthcoming World Bank manual on improved labor-based construction methods.
- Contract officers and bureaus should prepare a catalog of experts and consultants having specialized rural roads experience.
- Information collection should be more timely and cost effective. PPC and DSB should sponsor seminars and develop and disseminate information on rapid rural appraisal, starting with the materials from the two seminars in 1979 and 1980 held at the Institute of Development Studies, Sussex University, United Kingdom.
- Project designers should prepare Project Papers that take into account the workload imposed on host government officials by multidonor programs and project implementation.
- AID/W should consider activating more regional support offices, such as AID's regional African offices, to provide specialized support to missions.

b. Economic Analysis Issue As currently performed, economic analysis is not cost-effective. Calculations are often cooked; data is inadequate, weak, and wrong; variables such as travel time and benefits related to equity are not quantified. Furthermore, the attention to economic analysis is not properly balanced relative to engineering and social soundness concerns, nor is it linked with other forms of analysis. Finally, contractors performing the economic analysis are not monitored. The resulting work is often inappropriate and misapplied.



### Recommendations

- Design teams and AID/W should develop more cost effective economic analysis such as utilizing selection criteria for rural local roads as a proxy for internal rates of return.
- PPC and DSB should provide a portfolio of "model" terms of reference for economic analysis of various road projects.
- PPC and DSB should disseminate state-of-the-art methods in economic analysis of rural roads, such as the Kenya experience illustrating use of selection criteria.
- There should be closer field monitoring of contractors by missions and regional office
- Design officers should integrate economic analysis more thoroughly into PPs.
- Design teams should use more sensitivity analysis.

### c. Social Soundness Issues

Issue Social analysis is often deficient. For example, impact evaluation teams found that land tenure difficulties and equity considerations were not carefully considered during project preparation.

### Recommendations

- Social analysis must be better integrated into the PP. Social science inputs must be continued through the implementation and evaluation of the project. Project managers should provide for the appropriate timing of social science input throughout the design and implementation.

All team members should be involved in determining the beneficiaries and the social impact of the project. Possible techniques include joint field visits with host country personnel, role playing in which various specialists take unfamiliar roles, and simulation games based on a road project design problem. The AID/W training office should sponsor workshops, seminars, and training in new management techniques involving role playing and simulation games based on evaluation material.

Issue The capital/labor mix in rural road construction is often not appropriate to the setting. The mix is determined by several major factors including availability of both local labor and management/supervisory skills; foreign exchange; cultural/attitudinal background; physical factors, i.e., topography, terrain, and proximity of construction material.

Recommendation The PP must assess the relative importance of the above factors on a country-specific basis.

### C. Integration

#### a. Rural Roads as Part of the Dynamics of Development

Rural roads are one of the most tangible aspects of access and communication in rural areas. They play a service or supporting role for other forms of rural development. To analyze, implement, or evaluate rural roads, it is necessary to integrate the roads into the larger development context in which national and international institutions and processes interact with local institutions and processes. The purpose of this discussion is to shift from a static concept of the road as an end in itself to the integration of rural roads into the process of development.

To accomplish this refocusing, there is a need to reconsider recent evidence on

- maximizing of impacts and benefits
- increasing cost-effectiveness
- using alternative options for institutional organization, i.e., better use of people.

These three elements are interrelated. We propose to examine them in the context of a reformulated definition of costs/benefits permitting the incorporation of engineering and non-engineering concerns into a common framework.

"Benefits" include not only monetary or physical production increases but also positive effects on institutional development, equity, communications, time savings, the environment, etc. "Costs" include social and environmental considerations as well as normal requirements for construction and maintenance.

#### b. Maximization of Benefits

A rural road does not result automatically in a well-defined or predetermined set of benefits. These flow from the social, economic, cultural, and political context and the technical adequacy of the road itself. To maximize benefits in any particular context, one must begin with an identification of the beneficiaries at all levels.

Effective planning integrates an understanding of the "environment" with people's need for access. One example of such an integrated decision-making model is shown in Figure 2. This model illustrates one approach to integrating different sectors and disciplines into rural road project design.

Recognizing the difficulties of integrating such a diverse team, we suggest several measures:

- joint preparation of the log frame
- the use of personnel with specific experience in the geographic area and broad sensitivity to its development context
- actually working together over a significant period of time.

The impact evaluations noted that where the construction of rural roads was not part of institutional or local development, the impacts achieved were disappointing, if not negative. Where the implementing agency did not effectively integrate design with local needs or participation, benefits were often not equitably distributed (e.g., Honduras, Liberia). To accomplish better integration at this level and thus increase positive impact, institutions building rural roads should examine options regarding rural road selection, community participation, and complementary services such as agricultural inputs, extension, and marketing services.

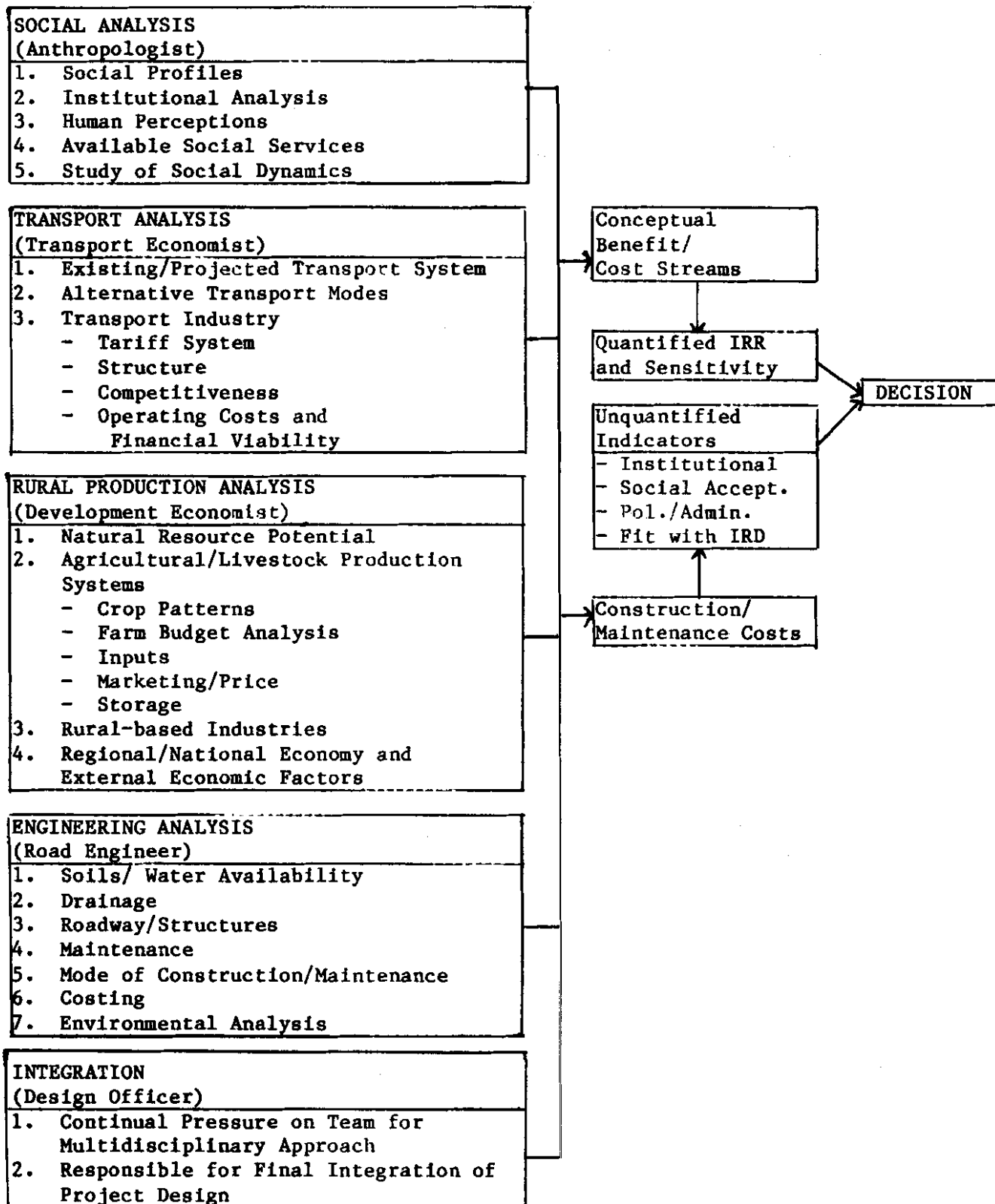
The implementing institution should be part of an institutional framework. The Thai experience indicates that there is potential for maximizing long-term benefits if the road-building institution is intentionally integrated with other governmental institutions on a regional or national level.

Ex post evaluations of rural roads are extremely complex because of the nature of the impacts identified above. It is difficult to separate the various effects of a rural road, even when some time has elapsed between construction and maintenance. With our broadened definition of benefits, however, such ex post evaluations are an essential part of planning and implementation. Use and maintenance of a rural road are perhaps the best--and most readily visible--evidence of effective planning and implementation. Feedback from the constructed roads can be instrumental in planning for maximum benefits in future projects and for modifying implementation approaches.

#### c. Cost-Effectiveness

At the analysis stage, if the role of the road in the broader development context is better understood, the engineer will be better informed on such technical issues as road standards and the probability

Figure 2. Integrated Decision-Making Model for Rural Road Investment



of maintenance. This awareness helps minimize construction costs. Beyond these considerations are non-quantified social, institutional, and environmental costs, which, if not carefully identified and minimized, can overwhelm benefits. When considering all costs related to planning, design, implementation, and evaluation, it is essential to keep in mind non-monetary costs and benefits as well.

d. Better Use of People

Roads can enhance a community's access and standard of living, but it also bears mentioning that roads allow individual initiative and enterprise to be expressed. Community participation in both planning and construction may be a way to mobilize this initiative while preventing undue exploitation of the road facilities by any one individual or group.

The level of engineering design and quality of construction are associated with varying requirements for scarce talent. Integrating this concern into the selection of institutions and the choice of implementation modes can permit total benefits to be maximized.

The availability of rural roads and complementary transport facilities also permits users to make more effective use of their time. This reduces costs for other development activities and supplements the supply of human resources needed for development.

e. Recommendations

-- AID should rid itself of the implicit notion that rural roads are not productive. "New Directions" are consistent with a development perspective that includes roads. Just as rural development is a long-term process, rural roads should be considered in a similar light. This conference is evidence that this process is already beginning.

-- Funding levels for rural roads should be re-examined in the context of country program strategies. PPC should establish new percentage guidelines on the rural roads portions of integrated rural development projects. Missions should contribute regional analysis examining funding needs on the local level.

-- CDSSs should include analysis of the role of access in meeting overall rural development objectives. Missions should receive guidance on this from the AID Administrator.

-- AID staff should be upgraded and contractors should be sensitized to an expanded cost/benefit model. Additional training should be offered for AID direct-hire engineers on non-engineering issues and to

non-engineers on transport issues. Multidisciplinary design teams should be set up for PID and PP work. The presence or continuity of direct-hire staff involvement on rural roads projects should be encouraged. Project monitors should be sensitized to local access situations.

-- Support should be given to developing transport institutions (not only at the central government level) in order to ensure continuity of personnel, especially where access and feeder roads are concerned. Institution building in this sector should be included as a project design option. Use of manpower development funds should be expanded. Local capacity to maintain equipment, vehicles, and tools should also be analyzed. Improving local capacity may require some revision of procurement.

-- AID should adjust the 611(a) funding ceiling upward to reflect the increasing cost of roads or assign engineers to every mission. This will promote community participation and more flexible selection criteria.

-- Multi-donor integration should be increased where rural arterial road construction is indicated. AID has several means to put funds into major infrastructure projects that involve private construction enterprises; a useful one is the "parallel funding approach" used in the Cameroon roads project.

-- AID should assist regional and national bodies in transport planning. Technical assistance and training should be given to host country counterparts in transport planning. AID rural road activities in any country should be coordinated with what the World Bank is doing.

-- AID should test and analyze the effect of alternative transport modes in improving access and should use the integrated approach and expanded cost/benefit model as described above. DSB and the regional bureaus should work up this improved approach with the collaboration of transport economists, planners, and design engineers, perhaps as a task force or as a part of the Agency's work in capital-saving technology.

-- At the country level, AID should assist the local transport industry to upgrade itself, such as through credit programs to transporters.

-- PPC should avoid generalizing solutions to transport improvement.

#### D. Selection

a. Issue How and when should equity factors be applied in the selection process?

Considerations of equity shape a project's general design. Within the general framework of the project, however, specific roads will be selected later for financing.

Some argue that to be eligible for final selection a road must first pass a minimum economic return test; then equity factors are applied in prioritizing. Others argue that equity factors should be incorporated into the economic analysis, e.g., by weighting certain benefits depending on income level of beneficiaries. Still others argue that the economic analysis should be just one of the factors in the selection process. (These issues are discussed in the Kenya and Philippines impact evaluations.)

Recommendation The economic test should not be used as a cut-off. AID should permit equity considerations to be included in, or together with, the economic analysis when selection is made. AID Handbook 3 should be revised to incorporate this recommendation.

b. Issue To what extent should community interest in and commitment to a road construction project be a selection factor?

Many believe that the best indicator of the ultimate success of a road project (e.g., use, maintenance) is community interest and commitment. This is shown not only by a community's actively seeking the road and participating in design, but also in the willingness of members to contribute labor or other items of value to construction and maintenance.

Some members of the group would make such community involvement a precondition for selection; others would make it a strong factor in prioritization. All feel that the rule adopted should be flexible enough to permit exceptions where justified.

Recommendation AID should require that community commitment to a road project (as evidenced by contributions of labor or other items of value to construction and maintenance) be a strong factor in prioritization of roads, or that such commitment be a precondition for road selection. AID Handbook 3 should be revised to incorporate this recommendation.

c. Issue Should roads be selected only where complementary services are available to beneficiaries or where there is a plan for such services?

Complementary services may already be in place, may be part of the project package as in integrated rural development, or may be planned and committed for the future by the government. The group concluded that in general roads should be selected only where such complementary services are present or planned; as pointed out in several of the impact evaluations, impacts can be maximized in this way. The group also recognized the contrary experience of the Colombia Pico y Pala project, however, and would not be dogmatic.

Recommendation Roads should be selected only where complementary services are present or planned, except where the proposers are able to demonstrate that impacts will be significant in spite of the absence of such services. AID Handbook 3 should be revised to incorporate this recommendation.

d. Issue Should AID refuse to allow selection of roads that benefit an area of high economic potential but do not primarily benefit the poor?

The group felt that there should be a priority given to roads directly benefiting the poor. It was the consensus, however, that where there is a strong government commitment to use increased resources to benefit the poor, AID should permit selection of roads that are designed mainly to achieve substantial production increases.

Recommendation While continuing to emphasize roads that directly benefit the rural poor, AID should also fund roads that achieve high production increases where the recipient government's policies are to use increased resources for programs benefiting the poor. PPC should prepare a policy paper, for approval by the Administrator, incorporating this recommendation.

#### E. Maintenance

Road maintenance means keeping the road in a condition that permits vehicles to operate at the desired cost level. Total transport cost is the sum of the construction, maintenance, and vehicle operating costs.

Maintenance represents an ongoing expense that increases with the road network. The yearly cost of maintenance represents a small fraction of the replacement cost of the road, approximately 1 to 3 percent. Recent studies indicate that expenditures on maintenance in the LDCs usually provide a much higher rate of return than if spent on new construction.

Maintenance of roads is of increasing concern to AID and other donors. Except in a few countries, maintenance of roads has been woefully neglected, as confirmed by six of the eight rural road impact evaluations. The deterioration of a road results in high political, social, economic, and environmental costs and may result in a complete loss of the original investment. The working group feels that it is essential to protect that investment by establishing a systematic, efficient, and adequate maintenance capability.

The working group believes that maintenance continues to be ineffective because of lack of commitment to clear policy, insufficient allocation of resources, and ineffective executing organizations.



### Policy Recommendations

-- AID financing of road maintenance should be encouraged. AID should finance maintenance programs rather than new construction unless it is clear that the latter will generate greater economic, social, and political benefits. The extent of AID financing should be contingent on the effectiveness of the host country's maintenance effort.

-- The host country should have a long-term commitment to maintenance. AID should encourage the host country to formulate and implement a road maintenance program. Host country programs should provide for local participation in labor and funding to the maximum extent feasible. Revenue generation from user charges or special road taxes should be explored. A system of weight and traffic control should be established and enforced for marginal or seasonal roads.

-- Maintenance must be recognized as an integral part of an overall construction/rehabilitation program. AID should recognize that commitment to maintenance programs is really long term (up to 20 years) with realistically achievable short- and medium-term goals to encourage progress. Expatriate technical assistance should be provided as necessary.

-- AID and other donors should cooperate more closely to coordinate construction and maintenance programs with host countries. AID disbursements for new road construction and rehabilitation should be tied to satisfactory progress by the host country in achieving its maintenance goals.

### Recommendations on Resources Issues

-- Road planning requires thorough assessment of maintenance costs and resources. The level of construction and maintenance determines the life of a road and affects the benefits. The costs and sources of funding for maintenance must be identified at the outset of project design. These funding commitments for maintenance should have priority over the allocation of funds for new construction.

-- Use of labor and equipment must be optimized. Many LDCs have underutilized labor resources with low shadow prices. A thorough analysis of the appropriate labor/equipment mix, including job management capability, should be an integral part of the project design process.

-- A monitoring system should be established to evaluate all maintenance projects, especially those having a long-term component. The present policy on maintenance project life requires that an unrealistic time frame be used. In order to support adequately a road construction project with maintenance as an integral component, project life must be

extended to 10, 15, or more years to coincide with the road's life cycle. Donor financing leverage can be an important tool to encourage host country assumption of maintenance responsibility over the project life. Project identification and design should thoroughly define the maintenance program. The labor equipment mix analysis should become a standard checklist in preparation of the PID and PP.

### Implementation Issues

- Host country maintenance capabilities must be enhanced. Host countries often lack the financial, technical, labor, and equipment capacity to undertake adequate maintenance programs. An agency with clearly defined responsibilities for road maintenance, preferably on a decentralized basis, should be identified or created.
- Community involvement in maintenance should be encouraged. The experience of AID-financed projects indicates that community involvement in construction of rural roads leads to lower costs and greater local commitment. This involvement should be continued for maintenance, at least for the routine activities. Involvement, however, should be clearly distinguished from control of the maintenance effort.
- Road construction projects without provisions for maintenance should be discouraged. AID should undertake only road projects that attempt to develop a road maintenance capacity based on a long-term plan, including annual maintenance programming.

Summary The role of the host country agency responsible for maintenance is crucial. Without the commitment to maintenance and a realistic plan for execution, the maintenance program will probably founder. Projects funded by AID must ensure that an adequate maintenance capacity exists or will exist. As necessary, provisions should be made to strengthen such agencies and include manpower development, equipment maintenance capability, spare parts supply, and communications. Various methods for community involvement and compensation for services should also be worked out at the design stage of the project. Programs for traffic and weight control should also be worked out at this time.

### F. Is AID Seeking Successful Projects or Long-Term Development?

#### a. The Issue Restated

In the selection and design of rural roads projects, what factors should be considered in negotiating with a host government in order to increase the chances of a successful development project?

Recommendations AID has no explicit rural roads policy. The team recommends that the AID Administrator issue a policy determination requiring that missions take into account the following factors in proposing projects involving rural roads.<sup>30</sup> The policy determination should be subject to continuous review.

b. Macro-Policy Issues

- Examination of national systems of agricultural pricing and input distribution to determine whether sufficient incentives exist to warrant the project and to achieve increases in production.
- Examination of marketing systems, both national and private, monopolistic or competitive, to review whether the movement from a subsistence to a market economy is possible.
- Examination of government centralization or decentralization policies and practices for road construction and maintenance to determine how such policies will affect the project, or how these policies and practices can be used or modified to improve the development potential of the project.
- Examination of the strengths and weaknesses of the public and private sectors in transport and agro-industry so that their potential for investment is taken into account in the design of the project.
- Examination of government policies for equitable distribution of access to services by class, ethnicity, sex, caste, region, or tribe. Because social diversity is a characteristic of most nations, a national rural roads project is questionable.
- Examination of governmental or traditional practices concerning dispute settlement, land and other productive factors, and compensation in order to determine the likelihood of equity.
- Examination of governmental practices in order to explore the possibility of real local participation in decision-making.

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<sup>30</sup> A Rural Roads and Transport Working Group was established in January 1981 and drafted the policy statement found in Appendix A.

-- Examination of the nation's capacity to plan, design, and evaluate sector programs and projects.

c. Programming Issues

-- Analysis of government intersectoral priorities in investment in both capital and current accounts.

-- Analysis of government budget allocations to poor, wealthy, and potentially productive regions for economic, political, or other reasons.

-- Analysis of government budget allocations by type of roads (national highway, rural arterial, etc.).

-- Analysis of government budget allocations for construction and maintenance of roads, including new construction and upgrading.

-- Analysis of feasible construction methods, including labor-based and equipment-based construction.

-- Analysis of institutional road building and maintenance capacity at the national and sub-national levels.

-- Analysis of the potential impact of rural roads on direct and indirect employment generation.

-- Analysis of surplus civil service employment by region to determine whether this plays a role in national-level road selection.

d. Project and Site Selection Issues

-- Analysis of location in terms of equity and potential income redistribution.

-- Analysis of institutional capacity for effective performance, maintenance, and replicability of successful projects.

-- Analysis of cost/benefit ratios, both in the aggregate and by family.

-- Analysis of road standards appropriate to traffic volumes and functions.

-- Analysis of the degree of local participation in project implementation and site selection.

- Analysis of potential benefits and adverse impacts of the projects, including environmental and energy considerations.
- Analysis of the availability of labor, construction skills, and supervisory personnel for labor-intensive projects.
- Analysis of the potential for institutionalization of selection, design standards, construction, and maintenance at the national or sub-national level and, as necessary, the amount of training necessary to achieve project continuation and replicability.
- Analysis of governmental or academic capacity to determine the social and economic causes of equitable or inequitable distribution of project impacts.
- Analysis of land ownership, tenancy, security of tenancy, land use, and land prices in project areas.
- Analysis of the financial sustainability of the project, including regular maintenance financed through road user fees collected through one or more mechanisms including tolls, licensing fees, or gasoline taxes.

e. Monitoring and Evaluation

- Monitoring should be continuous and performed jointly with the host institution. AID must recognize the staff requirements for adequate supervision and site visits.
- Evaluations to improve project performance should be conducted jointly with the host institution at appropriate times.

f. Criteria for Assessing Successful Projects

- Projects should be evaluated on their completion or on the completion of discrete segments to determine their relative success in terms of the following:
  - cost/impacts (both beneficial and adverse)
  - physical completion according to project design
  - beneficiary analysis
  - institutionalization of road building and maintenance
  - self-sustaining capacity of the road administration including collecting appropriate fees for maintenance
  - timing for both road completion and impact on beneficiaries

g. Administrative Actions to Improve Rural Road Projects

- Reform of US contracting and procurement regulations to improve timing.
- Reform of US technical assistance contracting to provide better technical skills and country-specific knowledge.
- Improvement of AID staffing patterns including:
  - longer tenure at post to ensure continuity
  - improved language skills
  - improved area and cultural training for better compatibility with local institutions.
- Increased financial flexibility for quicker response to local needs.
- Increased administrative flexibility to improve project implementation.
- Improved information systems for local continuity and international comparability.

h. Strategy for Implementing the Policy Determination

Policy determinations in handbooks do not by themselves improve performance. Like the contribution of rural roads to rural development, they are a necessary but not sufficient condition.

The following actions are recommended for monitoring rural road projects.

- All rural road PIDs and PPs will be designed and reviewed in accordance with the policy determination.
- The burden of exclusion of any recommendations from project design will be on the mission, and negative findings of policies that might adversely affect project success must be explained by the proposer.
- An ad hoc, interdisciplinary advisory group will be established to ensure compatibility of projects with the policy determination. A representative of this group will attend all PID and PP reviews.
- That representative, if overridden in the review process, will have access to the next executive level of the Agency to make representation of these views.

-- Upon evaluation of successfully completed rural roads projects based on the above criteria, those responsible for its design and implementation, including the responsible mission director, will have appropriate commendations placed in their personnel files.

-- Conversely, projects that do not adhere to this determination and fail will be noted, and the design officers will have appropriate notes placed in their files.

-- Awards or bonuses will be given to those officers who have done outstanding jobs in design and implementation of successful rural roads projects.

#### G. Equity

##### a. General

Equity considerations in road projects are often ignored. Previous evaluations found that few road projects led to a reduction of inequity, and some contributed to absolute declines in incomes of the poor, particularly through the alienation of land and loss of employment opportunities.

In agricultural development, benefits of rural roads are distributed in proportion to access to land, capital, and in certain cases, household labor. Those who have or can acquire these assets reap most of the benefits, including:

- reduction of the costs of inputs, such as fertilizer, improved seed, and credit
- increased use of inputs
- reduction in transport costs
- increased net farmgate prices
- increased production
- increased land values

All impact evaluations found these effects.

In cases where land tenure was not secure, such as Liberia, Honduras I, or Nepal, wealthy "land grabbers" displaced the poor from their land and gained most of the benefits.<sup>31</sup> Furthermore, rural roads projects stimulated a shift from subsistence crops to cash crops (Sierra Leone, Colombia, Liberia, the Philippines, Honduras, Kenya). This shift could adversely affect food production and nutrition levels for some groups (Liberia, Sierra Leone).

With social services, the issue was less decisive. Although access by the poor to health care, primary education, and reduction of wet-season related hardships was often enhanced, this did not occur automatically. Particular measures may be necessary to ensure the equity-producing results of rural roads.

### Recommendations

- AID should not support rural roads projects unless independent analysis indicates that the distribution of benefits will favor the poor.
- AID should identify host countries, and within them institutions and persons sympathetic and interested in equity considerations and seek to work through them.
- AID should strengthen its own institutions and procedures in order to make equity considerations binding in the identification, design, and implementation of projects.
- As a standard part of all CDSSs AID should identify vulnerable and deprived groups, the reasons why they are poor, and ways in which they attempt to meet their basic needs. This basic statement should be the basis of subsequent road project decisions by the mission.
- A PP's social soundness analysis should contain specific and local analysis of these groups, as well as an analysis of the impact upon them of the proposed project. In addition, a checklist (see pp. 56-57) of equity criteria for project design and review should be explicitly examined.
- The Social Soundness Analysis (SSA) should be carried out before the PID so that the SSA can be integral to the design of the project.
- Project design should minimize effects on vulnerable groups and give adequate and direct compensation.

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<sup>31</sup> Blaikie, Piers, John Cameron and David Seddon, "The Effects of Roads in West Central Nepal," Overseas Development Group, University of East Anglia, February 1977.



b. Community Involvement in Decision-Making and Implementation

Since equitable development involves an increase in the power that poor people have over their lives, community participation must be an integral part of that process. Broad, local involvement at all stages of road construction yields an increased sense of control over the environment and stimulates local action toward other goals.

There are several points in the project cycle at which specific benefits accrue:

-- In route selection, community participation often improves the eventual alignment to reflect local priorities (e.g., Indonesia, India, Colombia/Kamza).

-- In implementation, community participation can take the form of labor-based construction, providing employment and income that is recycled locally (e.g., Kenya, Guatemala, Colombia, Indonesia).

-- Prior involvement also creates commitment, organization, and skills for minor maintenance during the project (e.g., Guatemala, Colombia, Indonesia, Kenya) and sustained community participation after the project (e.g., cooperatives and community groups; Honduras, Colombia).

There are certain conditions under which broad community involvement in decision-making can be more easily affected:

-- Where the region is primarily one of small farmers with relatively equitable land distribution

-- Where effective local institutions exist that widely represent the interests of heterogeneous groups

-- Where a tradition of communal labor exists that is not based on indenture and coercion

-- Where the government agencies involved support local participation as well as rural development and equity objectives

Recommendation AID should work with host governments in ways that maximize community involvement in decision-making and implementation. To determine where such community-oriented projects are possible, the Agency should:

-- perform a preliminary social impact analysis involving a checklist to identify where such projects are possible.

-- develop better skills among AID personnel to determine the potential for community participation.

- generate and rapidly evaluate a larger number of potential projects, and eventually select a limited number to be implemented.
- seek and obtain host government commitment of financial and human resources for equitable and decentralized development.
- involve and strengthen local and regional road-building institutions through training, participation in alignment selection, road design, construction, and maintenance. These institutions are most sensitive to local needs and equity questions.
- hire Third World nationals with labor-based construction experience, e.g., Mexicans in Guatemala, Kenyans in Africa.

c. Equity Checklist

The questions below should help ascertain whether a project will promote equity. Even if all questions are answered in the affirmative, a project is not assured of having positive benefits. Conversely, a project for which several answers are negative may still be acceptable on equity grounds.

- 1) Will road construction meet a widely felt need? Is there evidence of prior local involvement in seeking greater access to resources?
- 2) Are village-level land tenure and access patterns equitable? Particular attention must be devoted to the vulnerabilities of the sick, the very old, the very young, women, ethnic minorities, lower classes, and the landless or near landless. Where vulnerable groups or poor communities are identified, will the road alignments serve them? If not, the following should be considered:
  - Will the road building effort have adequate safeguards to prevent unequitable distribution of benefits? Safeguards include full cash compensation for land appropriation and biasing the agricultural extension effort toward the vulnerable groups.
  - If a significant proportion of landless poor exist, will their equity position be advanced by short-term employment on the project or long-term, improved access to non-agricultural employment?
  - Are there local institutions or organizations that adequately represent and advance the interests of the poor, e.g., cooperatives or private voluntary organizations?
- 3) If net disposable income from cash crops is likely to increase over time, certain safeguards might be necessary.
  - Is the nutrition of the communities likely to be adversely affected?

- Will receipts from cash crop sales be enough to compensate for the shift from subsistence crops?
- Is the project designed so that the environmental effects of road building will not fall disproportionately on the vulnerable members of the community?
- Are there other development projects at work in the area? Can the projects reinforce each other?
- Are existing health resources adequate to take advantage of increased accessibility? Is it possible to integrate an expanded health care program into road building? Can rural roads complement future health care delivery systems?
- Are existing educational resources adequate to take advantage of increased accessibility?
- Is the equity orientation of the central government likely to provide a favorable environment for road building? If not, are there forces for change within the central government? Is the public works or highway ministry the appropriate central government institution for rural road projects? Is the decentralization of project implementation and decision-making a more appropriate way of achieving equity goals in road building?

#### H. Transport Industry

The transport industry includes those public and private organizations that move goods and passengers. (Excluded from this definition are marketing, warehousing, and storage organizations.) A healthy, competitive transport industry is necessary to realize the benefits of rural road improvement.

##### a. Findings of the Rural Road Impact Evaluations

Because of new roads and increased transport competition, Colombia, the Philippines, and Thailand showed dramatic increases in farmer return. Jamaica failed to realize decreased freight and passenger rates because of lack of competition in the transport industry. And although the new roads in Liberia and Kenya decreased transport costs for the industry, lack of competition limited the reduction in prices paid by customers.

b. Recommendations for Improvement of Project Design

1) Project design must identify the beneficiaries and their present and projected demand for the movement of goods and passengers, both on- and off-farm. The nature, magnitude, frequency, and duration of target group needs must be quantified.

2) The supply of transport services must be compared to present and projected demand, and the difference calculated.

3) AID should consider financing the development and purchase of vehicles, including non-motorized ones.

4) Constraints hampering supply response of the transport industry must be identified and reduced. The major constraints are:

a) present transport industry capacity

b) government regulation of the transport industry

-- foreign exchange restrictions on the acquisition of vehicles, parts, fuels, and lubricants

-- regulated freight and passenger rates

-- licensing control, regulation, fees, and use restrictions

-- taxes on vehicles, parts, tires, and fuels

-- excise taxes on cargoes and passengers

-- corporate taxes

c) credit availability, interest rates, terms of repayment

d) operational constraints

-- availability of trained operators

-- limited dealer maintenance and parts support service

-- poor distribution and uncertain availability of fuels and lubricants

-- seasonal demand for transport industry services

-- seasonal condition of roads and tracks

c. Policy Recommendations

- AID should focus attention on roads and the transport industry.
- In conjunction with each country or regional program anticipating a rural road project, a periodic survey should be made of rural transport needs, the transport industry, and its capability to meet present and projected service demands.
- Policies that impede the operation or growth of the transport industry should be identified and revised.
- To ensure the availability of capital for the transport industry, evaluate, and where appropriate, provide institutional credit guarantees or subsidies.
- Prior to the PID preparation an independent assessment team should prepare a review of the transport industry in the areas specified in these recommendations. This report should serve as the basis for the PID and subsequent PP documentation and should be reflected in the "Conditions Precedent" section of the project agreement.

I. Using Evaluation Lessons in the AID System

AID requires that evaluation findings be used in its decision-making processes. This requirement derives from AID's need to meet its responsibilities and from Congressional pressure to demonstrate the use of evaluation findings in AID projects.

For some time the Agency has had a formal system to meet these needs. The system, however, is characterized by lack of strong direction, mixed and variable application, and lack of incentives to use the results. In the past AID has not organized itself well for distribution and use of evaluation results.

Recommendations

- There should be a pre-PID requirement that project officers review lessons of experience in functional or sectoral areas before proceeding to design a project. Field officers should travel to AID/W for this purpose.
- AID should enforce the Handbook 3 guidelines that require a review of evaluation findings in the preparation of the PID. The Agency should withhold approval of the PID in the absence of such a review.

- AID should create staffs of technical experts in each bureau who would remain up-to-date in functional areas and be regularly available to project designers and reviewers in AID/W and missions. These staffs would have long-term continuity and would assure that PIDs reflect the most recent evaluation results.
- AID should provide annual in-service training for generalists and specialists through "trade shows" in various functional areas.
- AID should institutionalize the flow of evaluation findings to missions for project designers, to bureaus for project reviewers and evaluators, and to executive management for policy implications. Findings should be in brief, usable form. These findings could be circulated in the form of quarterly bulletins for various functional areas. Such bulletins could be easily stored and would take up little space. Another method could be to record syntheses of lessons on microfiche and distribute them to missions for reference. Microfiche abstracts should not exceed two pages, and microfiche readers would be required in missions.
- AID should return to three-stage project documentation. At the initial stage the mission would develop a new project idea, request AID/W's help in searching out state-of-the-art literature and evaluation results for similar projects, and send design officers to AID/W to review experience in this sector.
- AID should create standing Sector Working Groups that include evaluation personnel, regional technicians, and DSB experts in order to disseminate evaluation findings.

#### IV. FUTURE ACTION

The evaluation work already completed in the rural roads sector is substantial, but the test of success is whether the Agency uses the lessons.

##### A. Actions Taken

Two of the recommendations of the Rural Roads Evaluation Conference were for AID to issue a policy determination on transport and rural road activities and to form a Transport and Rural Roads Working Group to follow through on the important evaluation lessons in the rural roads area. On December 29, 1980, the Administrator approved an action memorandum authorizing the preparation of such a policy determination and establishing a Transport and Rural Roads Working Group. The draft policy statement is in Appendix A.

##### B. Improving Incentives for Using Rural Road Evaluation Lessons

At present AID employees, bureaus, and field missions have little reason to discover and use lessons from past experience in rural roads and other areas. The overwhelming importance placed on designing new projects and obligating funds and the scant praise for improving the impact of road projects are the causes of this situation.

Ensuring that the lessons of past rural road activities are used in future projects requires that AID increase incentives for disseminating and using the lessons. Project design and approval timetables are already extremely long. The lessons will not be used unless project officers, missions, and bureaus receive signals that applying the lessons to new projects is as important as quick design, review, and approval.

A number of possibilities exist to improve incentives for disseminating and using evaluation lessons. (See Appendix H for further details.) In the rural roads area a basic need is for PPC, DSB, regional bureaus, and missions to supply each other with abstracts of the principal evaluation lessons. A vigorous Transport and Rural Roads Working Group, with representatives from all interested bureaus, could agitate for use of the findings, communicate new findings to bureaus and missions, and devise a system for monitoring how well rural road PIDs and PPs reflect knowledge recently developed. The Working Group should also give some thought to how incentives for using the evaluation lessons could be improved. One possibility would be for the working group to devise a "fast approval track" for projects that have clearly made maximum use of evaluation lessons in their design process and in the project components. The Working Group could certify that particular projects move to the "fast approval track."

It is important that the design process allow opportunities for using the insights developed over the past two years. Project managers and design officers need brief, usable compilations of lessons learned in order to inform their earliest thinking about new projects. Traveling "roadshows" from Washington could visit regions to present major findings and inspect on-going rural road projects to illustrate problems and solutions. Design teams could be brought together in Washington or in the field before PID preparation. In an organized three-to-four day workshop they could focus on evaluation findings. A workshop leader, possibly a member of the Working Group, could manage role-playing and simulation exercises focused on aspects of project design found to be problems in the past. Team members could grapple with a variety of design problems and proposed remedies, such as maintenance, cost overruns and delays, environmental damage, benefits to poorer farmers, and land tenure changes. Unless PIDs evidenced the use of the evaluation findings, bureaus would not approve them. Members of the Working Group could present the evaluation findings to regional mission directors, conferences, or general design workshops. Mission directors, as well as other personnel, would then have some familiarity with the new ideas in rural road projects when they approve future PIDs.

These workshops could also include the other training mentioned in this report: new rapid appraisal techniques, improved and simple economic analysis, a broader rural road design model, and techniques for focusing on the beneficiaries and the transport needs of the poor.

The Agency should also reward individuals, missions, and bureaus that produce and use new evaluation findings. The fast approval track mentioned earlier could signal missions that it helps to pay attention to evaluation lessons. More substantial rewards, such as more funds, could be provided to missions and bureaus that use these lessons most effectively. Through outstanding PERs, merit-pay increases and awards, better jobs and promotions, the Agency could reward individuals who use evaluation lessons in new projects. The Transport and Rural Roads Working Group and PPC could identify the best impact evaluations of rural roads projects each fiscal year and see that the evaluation officers responsible receive outstanding PERs, awards, or promotions. Finally, to encourage the rest of the Agency to persevere in using evaluation lessons, the Working Group and PPC could carry out a rural road sector review at the end of FY 1981. The purpose would be to see how well bureaus and missions used evaluation lessons in Project Implementation Designs, Program Proposals, long-term planning strategies and Congressional Presentations. The Working Group could recommend rewards for those showing the most use.

Having produced important evaluation lessons for rural road projects, AID should follow through to see that these lessons are used. Descriptions of specific uses of findings and generalizations of progress in the overall sector would be useful. This will lead to improved design and impact of rural road activities.



# DRAFT

## APPENDIX A

### DRAFT POLICY STATEMENT

#### A.I.D. ASSISTANCE FOR RURAL ROADS AND TRANSPORT

##### I. Introduction

Rail and water facilities, and even air transport services, may play important roles in certain areas, but a dominant and almost universal need is for road systems that provide assured and relatively inexpensive means for the movement of people and goods. Roads are one of the most tangible aspects of access and communication in rural areas. Roads can reduce isolation, permit people to move more quickly and easily, stimulate agricultural crop production and marketing activities, encourage private enterprise and public service institutions, raise the value of land and other assets, and increase the potential for the transfer of technology and change. Indeed, roads are widely perceived as symbols of positive development.

Successful organization of road construction and maintenance activities can also play important roles in improving institutional capacity in developing countries. These activities require competent planning, design, financing, and scheduling -- whether done by force-account, contract, or self-help approaches. The actual construction and maintenance processes often require training of human resources -- supervisory personnel, skilled and unskilled labor, and, oftentimes, equipment operators. The resulting skills development can thus benefit both the government -- enabling it to continue to provide the public goods and services necessary to increase access and communication -- and the private sector -- by training and employing people not just in road and transport-related activities but in other types of construction and maintenance works as well.

The construction or upgrading of a road in a particular area does not, however, necessarily result in benefits for all or even for particular groups of people in that area. Whether people benefit is determined by the socio-economic, cultural, and political contexts of the road as well as by its physical characteristics. For example, although vehicles are a necessary component in the provision of transport over roads, the foreign exchange situation may dictate that few vehicles can be imported or that fuel to power them will be short. The benefits which would normally be

expected from the road would thus be reduced. Similarly, distribution of benefits realized from new road construction is often strongly influenced by the pre-road situation with regard to the distribution of assets -- land, capital, and in certain cases, household labor. Those persons or groups who have, or can acquire, these assets also stand to gain most of the benefits which the road engenders.

## II. Background

This view of roads as integral to access and communication and to the broader dynamics of development became the dominant theme at the recent Rural Roads<sup>1</sup> Evaluation Conference. The conclusion of the 90 conferees, which this policy determination endorses and expands, was that where physical (spatial) access or access to transport services are identified as major constraints to equitable growth, the Agency should be prepared to support road and related transport activities.<sup>2</sup> A.I.D.'s strategy for U.S. bilateral assistance endeavors to support developing countries in their efforts to satisfy, through sustained and equitable economic growth, the basic human needs of their populations.<sup>3</sup> Where there is evidence that deficiencies in transport services are inhibiting the achievement of these objectives, A.I.D. must be prepared to support efforts to overcome these deficiencies. This policy determination emphasizes those issues which Missions should consider in designing and implementing programs involving rural roads and transport.

The rationale for any specific road or related transport activity is expected to flow from broader problem analysis, such as that carried out in the preparation of Country Development Strategy Statements (CDSS). Thus, where increased food production or enhanced rural development are identified as strategic objectives, for example, A.I.D. should assess the roles which the construction, upgrading, or maintenance of roads or related transport activities (such as planning, transport policy analysis, vehicle maintenance, etc.) can play in achieving these objectives. If a positive contribution is identified, A.I.D. may wish to consider develop-

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<sup>1</sup>"Rural Roads" was used at the Conference and is used here to refer broadly to all roads in rural areas: feeder as well as secondary roads; collectors, local roads, and arterials; low volume and high.

<sup>2</sup>Activities relating to aspects of transportation other than road construction, upgrading, or maintenance are loosely categorized here under the rubric of "transport activities." Included are efforts relating to: planning and analysis, management, vehicle maintenance, storage facilities in conjunction with various transport modes, investments in water or rail facilities, etc.

<sup>3</sup>This strategy is more fully articulated in "A Strategy for a More Effective Bilateral Assistance Program," A.I.D., March, 1978.

ment of road or transport activities in the context of the overall production or development strategy, especially where other donors or the host country are unable to undertake all needed activities. It is important to note in this context that adequate rural roads and transport are often critical to achieving food security.

Where access or communication are identified as constraints common to a wide range of development objectives, A.I.D. should be prepared to examine the need for roads in the context of the entire transport sector. The need for "access networks" as a means for ensuring that the benefits generated by major infrastructure investments are brought within reach of the poor should receive special attention.<sup>1</sup>

Where access is one of several problems broadly inhibiting equitable growth and rural development prospects, then rural road and other transport support (farm-to-market roads, removing port and waterway bottlenecks through improved warehousing, providing technical assistance to revise road user charge systems and improve transportation management, etc.) may be integrated into other projects.

Fourteen rural road construction and upgrading projects were intensively reviewed in the recent series of impact evaluations. While there was considerable variation among the projects as to the technologies used, the types of roads constructed, the level of maintenance attained, and, of course, with regard to socio-economic and political contexts, four general results of road activities were noted:

1. Transport costs were often reduced. On the whole, projects involving new roads had greater positive impacts on farmgate prices, service improvement, the personal mobility of the population, and lowered transport costs than projects involving upgraded roads. The magnitude of the effect was often proportional to the competitiveness of the transport industry and, as a corollary, to the availability of transport services.
2. Agricultural production often increased. While more extensive cultivation generated the increase in two areas, the increases most often involved production of more perishable crops and a switch to cash crops. Positive changes in farm technology were also associated with road projects, especially where the roads facilitated complementary activities -- development of farm cooperatives, land reform, extension of credit -- which permitted realization of the full potential of the increased access provided by roads.

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<sup>1</sup>See the "Strategy for a More Effective Bilateral Assistance Program", pp. 36, 37, for more discussion of the "access network" concept.

3. The impact of rural road expansion or upgrading on the value of land was more complex. In most cases, the value of land on or near the road was enhanced by the construction of new roads. In a few cases, unfortunately, the potential increase in land value fostered land acquisition or land speculation by small groups or elites and the dispossession of a majority of local residents. These observations again suggest the importance of providing complementary inputs and services (such as agricultural inputs and extension services which enable local residents to increase the value of production) and ensuring the security of local land tenure as part of the road planning and design process.
4. Perhaps the most consistently positive observation in the impact evaluations had to do with roadside residents' perceived quality of life. Virtually all respondents questioned in the course of the evaluations noted that road construction (and even road upgrading) improved their lives through better access to services and were symbolic of progress.

Deeper appreciation of the complexities involved in assessing the impacts of a road can be gained by looking more closely at the summary report and the evaluation reports themselves.<sup>1</sup> Evaluating positive and negative benefits often proves to be a difficult task. Benefits in education or agriculture, for example, were in some cases offset by adverse effects in other sectors, such as health. The successful development of road-building institutions as well as the positive support extended to road-using institutions (such as cooperatives) in some cases was countered by breakdown of local institutions (such as those providing access to farm land). Perhaps most importantly, successful road construction was most often followed by poor maintenance and, in virtually all projects, construction costs were greater than anticipated.

### III. Elements of A.I.D. Policy on Transport and Rural Roads

A.I.D. policy on rural roads and transport consists of the following:

1. A.I.D. is prepared to fund road and other transport sector activities where the need for improved access and communication via rural roads has been established in the context of each country's development situation and articulated in the CDSS process. The role of the host country and other donor financing and the commitment of the host country to equitable growth are also expected to be treated in this context. It should also be clear that the road project or other transport-related activity will make a substantial contribution to the development of institutions or the dissemination or adaptation of technologies that are important to A.I.D.'s development objectives.

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<sup>1</sup>Available through S&T/DIU.

2. Projects and funding requests may be narrow in coverage, as for the construction of a single road segment, or broadly conceived, as in the support of an institution which will undertake the direction of a national or regional program to plan, construct, upgrade, or maintain rural roads.
3. The relationship of road and transport-related activities to the overall goal of equitable growth must be clearly articulated and reflected in the activity design, whether a proposed project involves road construction, upgrading, or maintenance as its primary objective or as one among many related development objectives.
4. A.I.D. will, in providing assistance for rural road and transport activities, recognize the needs for:
  - multidisciplinary design/analysis teams
  - continuity of support staff
  - comprehensive transport planning
  - complementary inputs and services, in the transport sector itself as well as in other sectors
  - appropriate road selection criteria and evaluation procedures
  - appropriate road standard determination, including those roads carrying mostly non-mechanized vehicles
  - appropriate concern for the area's physical environment
  - assurance of adequate host country capacity to plan, construct and maintain roads.

It should be particularly noted that, where seasonal or other underemployed labor is available, labor-based construction methods appropriate to the resource situation and suitable to road design standards should be used. Labor-based methods may also facilitate local participation and possibly reduce costs.

5. A.I.D. will, where appropriate, consider collaboration with other donors and U.S.G. agencies, such as the Department of Transportation, in the construction, upgrading, or maintenance of rural roads and transport facilities. This collaboration may take one of several forms; Missions are urged to consider various approaches to cost-sharing, cost reimbursement, and task allocation (feasibility analysis, design, construction, maintenance, training, etc.).

6. A.I.D. is not prepared to support rural road or transport activity where inequitable access is likely to preclude the majority of the population of the area from benefitting by the activity.
  - In cases where equity is likely to be severely reduced by construction or upgrading of a rural road under current conditions, activities which would alleviate the potential inequities should be undertaken prior to road construction. An example of such an activity would be land registration to increase tenant security and prevent untoward land alienation.
  - A.I.D. recognizes, however, that in most cases, inequities may increase somewhat as a result of road construction or upgrading. Special attention will be required in nearly all cases, therefore, to the development of complementary activities which will ameliorate this tendency (such as the extension of public services and the expansion of access to productive inputs through credit programs, cooperative development, and the like). This will require special analysis of projected benefit incidence and the devising of means to minimize negative impacts.
  - Community involvement in decision-making and in implementation with regard to rural road activity should be strongly encouraged. Indeed, project experience suggests that community participation may play a significant role in preventing undue exploitation of the road facilities by any one individual or group. Maximum participation of persons affected by plans for road and transport improvement should be sought both in project development and execution.
7. A.I.D. recognizes that maintenance of both existing and proposed roads is a major concern. Use and maintenance of a rural road are perhaps the best -- and most readily visible -- evidence of effective planning, analysis, and implementation. The poor maintenance which is evident in so many countries indicates the need for improvements, often in the areas of funding and personnel. Proper maintenance of constructed or upgraded roads requires clear commitment, adequate resources, and an effective institutional mechanism (either local or central) for implementing and monitoring maintenance. Economic analysis in the planning phase can highlight the importance of maintenance, by reflecting the probable steady deterioration and brief useful life that unmaintained roads face. A.I.D. is thus prepared to consider the financing of separate road maintenance activities in an institution-building context where the host country demonstrates willingness and commitment and where road and other transport sector activities supported by other donors are consistent and complementary.

A.I.D.'s assistance in both construction and maintenance will be contingent upon:

- thorough assessment of maintenance costs and resources over the life of the road, with the assessment preferably done in the planning/analysis and design stages;
- assessment of the appropriate mix of labor and equipment to be used; and
- consideration of host country institutional capability to assume effective responsibility for maintenance in the long term.<sup>1</sup>

Again, A.I.D. emphasizes that community involvement in road design and implementation may assist in addressing the maintenance issue.

In sum, the Agency is prepared to provide support for rural roads and transport in the context of support for equitable growth. A.I.D. strongly encourages the application of lessons learned from past experience, particularly with regard to community participation, the equitable distribution of benefits, the use of more appropriate analysis and design techniques, the provision of complementary inputs and services, and the selection of appropriate construction and maintenance methods. It is also important to sustain learning through continued evaluation.

#### IV. Further A.I.D. Program Implications

It is not expected that there will be an immediate and major program change as a result of this policy determination. Rather, it is expected that, over time, the analysis and implementation of rural road and transport activities will improve in quality and cost-effectiveness.

The establishment of an Agency Rural Roads and Transport Working Group was strongly recommended by the Conference participants to improve A.I.D.'s in-house capacity to implement and monitor this policy determination. This Working Group includes members from all regional bureaus, the Bureau for Science and Technology, the Department of Transportation, and the Bureau for Program and Policy Coordination. The Working Group will supervise the preparation and monitoring of road and transport program guidelines and ensure their dissemination to future multi-disciplinary design teams.<sup>2</sup>

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<sup>1</sup>Certification of this capability is already a statutory requirement under 611 (e).

<sup>2</sup>Such as the recent publication by the National Academy of Sciences on labor-based construction methods available from S&T/ENGR.

It is likely that, as the Working Group addresses the research agenda suggested by the Conference, additional program guidelines will be developed to improve Missions' abilities to handle the complex issues of rural road and transport activities.

Approved \_\_\_\_\_

Disapproved \_\_\_\_\_

Date \_\_\_\_\_



## APPENDIX B

### Tables

TABLE 1

RURAL ROADS/ROADS COMPONENTS PROJECTS\*  
BY YEARS COMPLETED  
FROM 1972 - 1982\*  
(\$000)

Region	1972		1973		1974		1975		1976		1977	
	Number of Projects	Expendi- tures	Number of Projects	Expendi- tures	Number of Projects	Expendi- tures	Number of Projects	Expendi- tures	Number of Projects	Expendi- tures	Number of Projects	Expendi- tures
AFRICA	3	\$3,019	5	\$9,362	-0-	-0-	6	\$29,683	2	\$32,391	2	\$ 1,418
ASIA	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	1	63,621
LATIN AMERICA	1	69	1	504	1	\$1,881	3	9,323	-0-	-0-	2	34,989
NEAR EAST	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	1	3,900
TOTAL	4	\$3,088	6	\$9,866	1	\$1,881	9	\$39,006	2	\$32,391	6	\$103,928

Region	1978		1979		1980		1981		1982		TOTAL FOR ALL YEARS	
	Number of Projects	Expendi- tures	Number of Projects	Expendi- tures	Number of Projects	Expendi- tures	Number of Projects	Expendi- tures	Number of Projects	Expendi- tures	Number of Projects	Expendi- tures
AFRICA	6	\$32,071	5	\$22,382	6	\$10,340	4	\$ 8,414	5	\$12,209	44	\$161,289
ASIA	1	4,779	3	16,845	3	5,386	4	5,149	3	52,726	15	148,506
LATIN AMERICA	-0-	-0-	1	2,282	7	24,305	3	20,079	4	17,954	23	111,386
NEAR EAST	1	4,500	3	19,757	2	1,605	-0-	-0-	1	26,400	8	56,162
TOTAL	8	\$41,350	12	\$61,266	18	\$41,636	11	\$33,642	13	\$109,289	90	\$477,843

\*Dollar figures should be understood as approximations since the total dollar values of projects with a rural roads component were included.

Sources: DS/DIU, FM/CAD.

TABLE 2

OBLIGATIONS OF RURAL ROADS/ROADS COMPONENTS PROJECTS<sup>3</sup>  
 BY YEARS STARTED  
 FROM 1972 - 1982  
 (\$000)

	<u>1972</u>		<u>1973</u>		<u>1974</u>		<u>1975</u>		<u>1976</u>		<u>1977</u>	
	<u>Number of Projects</u>	<u>Amount Obligated</u>	<u>Number of Projects</u>	<u>Amount Obligated</u>	<u>Number of Projects</u>	<u>Amount Obligated</u>	<u>Number of Projects</u>	<u>Amount Obligated</u>	<u>Number of Projects</u>	<u>Amount Obligated</u>	<u>Number of Projects</u>	<u>Amount Obligated</u>
<u>Region</u>												
AFRICA	4	\$22,523	1	\$10,300	3	\$28,447	5	\$28,028	1	\$ 2,992	8	\$37,446
ASIA	-0-	-0-	1	1,832	-0-	-0-	3	40,300	4	16,906	2	10,600
LATIN AMERICA	-0-	-0-	-0-	-0-	-0-	-0-	3	19,000	4	28,248	2	22,850
NEAR EAST	-0-	-0-	-0-	-0-	3	11,266	2	24,485	1	4,000	1	3,200
TOTAL	<u>4</u>	<u>\$22,523</u>	<u>2</u>	<u>\$12,132</u>	<u>6</u>	<u>\$39,713</u>	<u>12</u>	<u>\$111,813</u>	<u>10</u>	<u>\$52,146</u>	<u>13</u>	<u>\$74,096</u>
	<u>1978</u>		<u>1979</u>		<u>1980</u>		<u>1981(est.)</u>		<u>1982(est.)</u>		<u>TOTAL FOR ALL YEARS</u>	
	<u>Number of Projects</u>	<u>Amount Obligated</u>	<u>Number of Projects</u>	<u>Amount Obligated</u>	<u>Number of Projects</u>	<u>Amount Obligated</u>	<u>Number of Projects</u>	<u>Amount Obligated</u>	<u>Number of Projects</u>	<u>Amount Obligated</u>	<u>Number of Projects</u>	<u>Amount Obligated</u>
<u>Region</u>												
AFRICA	9	\$49,205	3	\$ 4,708	5	\$22,179	13 $\frac{1}{2}$	\$119,359	8 $\frac{1}{2}$	\$33,500	60	\$358,687
ASIA	2	19,693	1	35,000	2	5,860	2 $\frac{1}{2}$	12,125	1 $\frac{1}{2}$	35,000	18	177,316
LATIN AMERICA	6	59,600	2	16,600	2	9,500	4 $\frac{1}{2}$	19,175	3 $\frac{1}{2}$	9,335	25	184,308
NEAR EAST	-0-	-0-	1	26,400	1	15,000	-0-	-0-	-0-	-0-	9	84,351
TOTAL	<u>17</u>	<u>\$128,498</u>	<u>7</u>	<u>\$82,708</u>	<u>10</u>	<u>\$52,539</u>	<u>19</u>	<u>\$150,659</u>	<u>13</u>	<u>\$77,835</u>	<u>112</u>	<u>\$804,662</u>

<sup>1/</sup>Number includes projects in pipelines and decision package status, as taken from June 1980 Annual Budget Submissions.

<sup>2/</sup>Taken from June 1980 ABSs. Not clear that these do not include highways.

<sup>3/</sup>Dollar figures should be understood as approximations since the total dollar values of projects with a rural roads component were included.

Table 3 - Disciplinary Specialization of Rural Roads Evaluation Teams

[illegible]

Footnotes for Table 3

- a/ USAID/W direct-hire program evaluation officer and economist.
- b/ Report used 3 previous surveys by English social scientist. These were done for AID for discussion of impact. Social Scientist was with AID author of report during fieldwork.
- c/ USAID/W direct-hire: 1 project development officer and 1 evaluation officer.
- d/ USAID/Colombia Mission employee.
- e/ 1 U.S. contract-hire anthropologist from Stanford University; 2 local contract-hire sociologists.
- f/ USAID direct-hire rural development specialist.
- g/ On PASA contract from USDOT.
- h/ Two USAID direct hires: 1 international cooperations specialist, 1 political scientist. (IPA)
- i/ USAID direct-hire program evaluation officer.
- j/ Two are contract-hires, 1 local sociologist, 1 development anthropologist from State University of New York.
- k/ USAID/Philippines direct-hire IDI with local language.
- l/ Local contract-hires -- social scientists.
- m/ USAID/W direct-hire -- senior project officer.
- n/ U.S. contract-hire
- o/ One agricultural economist USAID direct-hire; the other is U.S. contract-hire from Texas A&M University.
- p/ ARD Thailand civil engineers assigned to team by government.
- q/ One local contract hire from University of Chiang Mai (sociologist/anthropologist) and one U.S. contract-hire (Drew University) sociologist/anthropologist.
- r/ USAID/Kenya employee, direct-hire.
- s/ USAID/W direct-hire also a transport economist.

## APPENDIX C

### PROCEDURES AND ADDITIONAL DEFINITIONS

#### 1. Procedures Used in Conducting Impact Evaluations

The rural roads sector coordinator in the Office of Evaluation, with the help of regional bureau evaluation staff, chose 14 projects in 8 countries to be evaluated. Table I lists the projects, countries, and other facts concerning the projects. Most of the projects were recently completed. Except for Honduras, where the two projects chosen were found to be a contrast between "Old" and "New Directions," multiple projects involved a similar activity. They were, therefore, treated as single cases. Counting two cases in Honduras, there are a total of nine cases in eight countries.

Of the 29 team members involved, 19 were AID employees. Teams were a mixture of generalists and specialists such as engineers, transport economists, anthropologists, and agricultural economists. Most team leaders were generalists with substantial interdisciplinary knowledge of rural development and long AID experience. To enhance objectivity, they were assigned projects outside their own bureaus. Specialists who were not AID employees were usually social scientists with local language capabilities, either from US universities or host countries.

All teams participated in a two- to three-day preparatory workshop in which they delved into project documents, defined major issues, agreed to site selection criteria, worked out timetables and budget needs, and planned further contacts and research before departing. All teams used two basic documents in their preparation: AID Program Evaluation Discussion Paper No. 2, "New Directions Rural Roads," which discusses institutional issues in rural road construction and the use of labor-based construction techniques, and Discussion Paper No. 7, "Socio-Economic and Environmental Impacts of Low-Volume Rural Roads: A Review of the Literature."

In their fieldwork, limited to three or four weeks, teams emphasized site visits and interviewing of a variety of beneficiaries. Generally, baseline data were lacking. Teams attempted to avoid biases by choosing sites representative of success, failure, and geographic, ethnic, and socio-economic diversity. Many teams included control sites unaffected by the project. For those teams that divided into sub-teams in order to visit a larger number of sites, most were careful to establish a common set of questions before they split up.

These eight impact evaluations cost relatively little--an average of \$10,000 in operating expenses, plus \$12,800 in program costs. These figures do not include salaries of AID employees because those salaries would have been paid in any case.

## 2. Additional Definitions

A number of the most significant definitions were included in Section I of the report. There are also several other distinctions that are important to understand when analyzing roads and transport.

Transport cost is an economic term and relates to what the task of transporting goods and passengers actually costs in gasoline, oil, tires, spare parts, proper maintenance, and other vehicle operating costs. Transport price is what the user must pay to the operator of the transport service. Thus, the price would be the price of a bus ticket for a passenger, the fee paid to the driver for transporting a sack of rice, or the trucker's invoice for a load of logs.

A reduction in transport cost does not necessarily cause a reduction in transport prices. Thus, a road may cause a considerable reduction in transport cost by reducing gasoline consumption, tire wear, and vehicle wear and tear. However, if transport prices are regulated by the government and not related to road condition, the users will end up paying the same prices for transport as before the road was improved. The same thing will happen if there is a lack of competition in the transport industry and the operators do not pass on cost savings to the public.

Another useful set of distinctions is the classifications of "rural roads" according to the perspective of the person defining rural roads. An administrator, for instance, is interested mainly in which branch of the government is responsible for planning, construction, and maintenance of the road. Accordingly, he may term a road as "classified" (implying central government recognition of the road) or "unclassified" (non-recognition of the road). A road may also be termed "primary" (the central government plans, constructs, and maintains these), "secondary" (responsibility for these belongs to the provincial government), or "tertiary" (usually in the jurisdiction of the local government or organization). An engineer thinks of roads in terms of appropriate design standards (e.g., width, type of surface, curvature, all-weather capability, and the volume of traffic that will use it) and is less interested in administrative classification. For planners the most important consideration is the function of the road.

## APPENDIX D

### SUMMARY FINDINGS OF IMPACT EVALUATIONS



ECONOMIC IMPACT

	Sierra Leone	Colombia	Liberia	Jamaica	Philippines	Thailand	Honduras	Kenya
A. Changes in Farm Technology	Some (B48-50)	Significant increase in use of fertilizer and improved seed (6, 7).	Some.	No road impact (8).	Some increas in the use of fertilizer. Most impact seen when roads are accompanied by other rural development activities (11, 16).	Significant change in technology in some areas. Greater use of fertilizer, new seed varieties, mechanized farming increasing (10-11).	O.D.: Sugar cane pre-dominates (6), multiple cropping encouraged (6) in some areas where INA has developed cooperative (8-9). N.D.: Multiple cropping declines in favor of corn; better irrigation needed (14).	RARs: Limited change in use of fertilizer or improved seed (8); multiple cropping indicated (7, 8); some on-farm mechanization observed (8).
B. Agricultural Production	Increased traffic indicates increased production (B60-65); cultivation of cash crops intensified (B52 ff, B54-55). Fallow periods	More extensive and more intensive land cultivation (6, 7). Increased production of perishable products.	More extensive cash crop cultivation; cultivation not more intensive, especially for subsistence crops (9, 10). Expansion of tree crops, marked increase in cash cropping, adverse effect on food	No road impact (9). Was time of general economic decline.	Along most penetration roads crop production increased somewhat through more intensive cultivation. Small to moderate	In certain areas roads facilitated more extensive and intensive land cultivation. Rice still most important crop, but diversifi	Substantial increase in land cultivated for Old Direction roads and New Direction roads (14); in both cases change in pro-	Limited increase in amount of land brought under cultivation (8, 9); cultivation already intense (8) more intensive cultivation



# IMPACT on TRANSPORT COSTS, PRICES and TRAVEL TIMES

	Sierra Leone	Colombia	Liberia	Jamaica	Philippines	Thailand	Honduras	Kenya
A. Vehicle Operating Cost Reduction	Positive due to lower fares on CARE roads (B65).	75% to 90% reduction (5).	Around 90% reduction (10).	About 40% for bananas on an improved road as compared to an unimproved road (D3).	Varied, depending on type of road/road improvement (7).	No information.	O.D.: Savings from \$.047 to \$.242 per vehicle kilometer for improvement from dirt to gravel (B5-B12). N.D.: Some reduction suggested.	Questionable (4, 18).
B. Decrease in Travel Time	Substantial	80% decrease (5, 6).	From two days by foot to only hours by vehicle for same trip (10, 11).	Not significant.	Varied, depending on type of road (7).	Substantial.	O.D.: Some suggested (5). N.D.: Some suggested (13).	Where transport is available, the travel times are drastically reduced.
C. Increase in Prices Received by Farmers	Farmers reportedly get better prices in town (B51).	Dramatic increase (6).	Considerable increase in farmgate prices for cash crops.	For bananas, 11% of gross increase in farmgate price (D3).	Higher prices given along penetration roads, no significant increase along upgraded roads (5, 6).	Differential between farmgate and market price fell more than 40% (9).	O.D.: No information. N.D.: Differential between market and farmgate price disappeared (13).	Prices fixed by government for major market and export crops (8).
D. Reduction in Passenger Fares	Passenger fares on CARE roads as much as 4 times less than fares on unimproved roads (B65); villages get more frequent service.	Passenger transport not commercialized prior to road project.	Passenger transport not commercialized prior to road project.	Not observed; few passenger vehicles operating on AID roads (D1).	Not observed for penetration roads; not significant on other roads after factoring out effects of fuel price increases (5-7).	Substantial; passenger transport not commercialized prior to road project.	Information not available.	Passenger transport not commercialized prior to RAR project.
E. Reductions in Freight Tariffs	No information.	Dramatic decreases (5), especially in transport costs for fertilizer and agricultural inputs (6, 7).	Considerable for hand-carried market products, bulk cargo. Some price discrimination for various commodities observed on newer roads (10, C8-C10).	Reduction between 30% and 40% possible, but lack of adequate transport and high price of transport a barrier to realization of full potential (D2).	Drastic reduction for transport of fertilizer along some penetration roads; on other roads reduction insignificant.	Price of transporting rice fell by 30% in Chaiyaphum (9).	Not available.	Transport costs for bulk high, often prohibitively so, due to shortage of vehicles. This also accounts for overwhelming amount of pedestrian traffic (13, 18).

# SOCIAL IMPACT

	Sierra Leone	Colombia	Liberia	Jamaica	Philippines	Thailand	Honduras	Kenya
A. Who Benefits	Whether poor benefit more than well-off is unknown (B74) roads accentuate whatever the prevailing tendency (9) and those within the sphere of influence of road benefit more. Some benefit to traders (66-67)	Beneficiaries tend to be the relatively poor (1), in mountain communities (3-4). Farmers benefit more than other jobs; commerce somewhat expanded (10).	Middle men, elites/wealthy benefit more as a result of roads (iii, 12-14) than do poor.	Existing pattern of economic benefits reinforced (10-11); this helped both rich and poor.	Cross-section of the community benefits; more enterprising and more well-off benefit most; commercial sector, appears to benefit a great deal (7-9). No significant change in the distribution of rural income and wealth (iii).	Everyone benefitted albeit to varying degrees (3-5) and types (13-14).	O.D.: Mostly large landholders. Increased field work and milling operations benefit small farmers (iii, 5).  N.D.: Agricultural reform plus roads augers potential benefits for small farmers (iii, 12, 13, 17).	Seems that more established farmers will take greater advantage of roads; but all people are benefitting to varying degrees (15).
B. Impact on Women	Unknown.	Women more mobile (9), participate more in community meetings (8), but actual change in status questionable (A3).	Increased participation in cash cropping and small businesses, increased mobility and independence (11). "Middle buyers" for truckers (12), impact expected to increase as more men migrate away.	Women were not a specific concern of the project, however, 87% of traders are women. Economic benefits of their position not strong because they do not own trucks (11).	Little mention of roads impact on women. Increase in women sewing for metropolitan firms along one road (9); increase employment of women on sugar plantations (8). Many operators of small commercial establishments, benefited by road construction, are women.	Women's roles strengthened (8).	Information not available.	Women getting to work on road help to increase family incomes (15).
C. Health, Nutrition, and Education	Suggests detriment to nutritional well-being (B50-59). While new health centers and more health services follow roads (B68) there is a threat of greater exposure to water-borne diseases with increase in swamp rice production (B68-69). Education activity increased with roads (B68-69).	Nutrition outlook improved (8). Greater access to curative medicine facilities but no increase in availability of preventive care (health care workers). No perceptible change in educational status but the expectation of better facilities (9).	Health care facilities increase (8). Evidence of possible increase in water-borne diseases caused by water standing in clogged drainage ditches (9). New schools follow roads (7-8).	Some better access.	Significant increase in visits by doctors and nurses; villagers travel more to town health facilities (11). No significant impact on education (10).	Ready access to health facilities, more health officers visit, but roads also allow spread of infectious diseases (vii, 7-10). Fish, meat more available; diet more nutritious (vii). Education especially secondary more accessible (9).	O.D.: Roads enabled easier access to services (e.g., medical services and schools) (11).  N.D.: Enhanced educational opportunities, access to services and amenities (15).	Greatest perceived benefit of a road is the ability to get a sick relative to hospital or get to clinic; education activities encouraged by roads (11-12). No clear answer on nutrition impact (11).
D. Effects on Migration	Unclear; trends vary (B70, B72, B69).	Little or no change. In one case out-migration was reversed (10).	Noticeable migration pressures (iv, 17).	Was supposed to help reverse migration but didn't (6, 8).	Significant immigration to one highly productive area now more accessible to markets. Little or no effect on outmigration.	Rural to rural migration sustained. Chinese urban to rural migration (8) as shopkeepers and/or middlemen.	No information.	Needs further study. Too soon to judge impact (16).
E. Perceived Quality of Life	No information.	Much improved (9). Demonstrator effect of roads (10).	Questionable (5).	Symbolic value of road; people "glad for the road," felt better having improved roads (12, E6).	People see progress in reduction of travel time, more comfortable rides, greater accessibility for health, educational, recreational and marketing purposes (12).	Life seen as better (15), services seen as more accessible (16) fuller participation in opportunities of nation make people more confident (34).	N.D.: See at least some improvement in quality of their lives (15).	People had no doubt that the roads would improve lives; perceptions were positive (11, 15). except in Vihiga where roads were allowed to deteriorate (4).

# EFFECTIVENESS SUMMARY

	Sierra Leone	Colombia	Liberia	Jamaica	Philippines	Thailand	Honduras	Kenya
1. Planning and Selection	Planning procedures unknown community and local government involvement in selection not indicated (B16, B19).	Methodology for formal economic justification developed, not always used by CV (3); good equity appropriateness (2-5); good community and local government involvement (10).	No formal economic appraisal (C1-2); equity considerations inadequate; high degree of local government involvement.	Selection on basis of appropriateness good as originally planned, poor after revision (1, 3, 8-9). Equity not given consideration (11, 10-11); fair amount of communication and local government involvement (11, 12-13).	As implemented, road selection had questionable economic justification (9); more consideration of equity needed (15); good involvement by provincial governments but very little at village level (2, 4, 15-16).	Selection criteria included security, population density and economic considerations. Criteria related to equity not discussed but trickle down approach used (3). Extent of community involvement unknown (2).	O.D.: Some economic justification called for in selection process (B1); gave no consideration to equity; local participation not originally planned, but occurred (2-3). N.D.: Appropriate consideration of economic feasibility and equity; local involvement in selection (16).	Vihiga: No information available. RAR: Technically weak but formal selection and appraisal procedures. Good local involvement in selection (Appendix E, I & II; 5).
2. Engineering	Design standards satisfactory. Roads built to specifications (B19-25).	Engineering preparation satisfactory; supervision good. Design standards good and roads built to specifications (3-4, C1).	Engineering preparation poor, as was supervision (5, C2-3). Design standards generally good except for drainage and insufficient width of some roads (C2).	Good engineering preparation and supervision. In actual execution drainage on some roads insufficient. Roads unnecessarily paved (H9-11).	Good engineering preparation and supervision. Roads had excessively high design standards (16).	Varied design standards according to the type of road. Engineering preparation and supervision not known (C1).	O.D.: Model of engineering resourcefulness (B1). Design standards good and excellent as planned (B1). N.D.: Generally good (B2-3).	Good supervision and engineering (5, 7).
3. Cost Overruns and time delays	In project 1 only 19% of planned roads completed. In project 2, 387 km of planned 640 km completed. Cost overruns on both projects (B22-23).	Only 52% of roads planned actually implemented; six months delay in implementation; cost overran planned \$12,000/km by \$10,500/km (3).	One year delay in implementing RR II. Cost overrun on RR I of \$3,000/km, or 20%; on RR II, 30% to 50% (5, C3).	Nine month delay in implementation. Only 56% of planned roads built. \$19,000/km cost overrun.	Construction costs varied from \$12,000 to \$60,000 per km.	Not known.	O.D.: Implementation delayed at least 18 months. Cost overrun original \$9,750/km projection by \$30,725/km (2, 3). N.D.: Implementation again delayed at least 18 months. Costs vary from \$1,698/km to \$25,745/km (C12).	Total costs currently, for RARs, US \$8,400/km; \$1,200/km more than planned. Report gives no indication or implementation scheduling or shortfalls. Actual cost for GBC roads is \$24,000 km (6).
4. Application of Labor-Based Techniques	Mostly equipment-based with some local voluntary labor. (B30-32).	Labor-based construction planned and successfully applied (C1-2).	Labor-based not planned (5). Mostly equipment-based.	Labor-based planned but capital intensive implemented (3-4, H3, H12).	Labor-based construction received very little consideration and was not implemented (15).	Labor-based not planned (5).	Equipment-based techniques used in both cases, although N.D. roads originally planned labor-based construction (2-3, 11-12, 18).	Labor-based construction planned and successfully applied (2, 5, 16). One of Vihiga roads equipment-based (2).
5. Development of local contracting Industry	No information.	No information.	Development of domestic contracting industry a secondary project objective, but not achieved (4, 18).	Project weakened local contracting industry (G3) as contracts held to fixed price at time steep inflation.	No information.	No information.	O.D.: Stimulated the formation of local road building firms (3).	Limited. Some mention of maintenance contractors (6).
6. Maintenance	Good where donor maintains; questionable where government maintains (B32-34).	Poor when responsibility for maintenance falls to GOC or when nature of damage exceeds campesinos' physical resources (11-12).	Poor (C3).	Poor (4, H3).	Poor (13).	Maintenance of existing roads higher priority than construction of new roads. Funding constraints. Current condition of roads varies from excellent to poor (6, vii).	O.D.: Maintenance capacity greatly improved (3, 4).	Appropriate and adequate in most cases on the RARs (6). Inadequate on the Vihiga roads (G3).
7. Institutionalization	Project had little effect on existing institutions although it led to the creation of a Feeder Road Project Coordinating Committee. Sustainability believed fair; some government commitment evidenced (B29, B30, B39).	Existing institution Caminos Vecinales (CV) strengthened; sustainability good. Reasonably capable institution, considerable local involvement, roads high priority.	Sustainability considered poor. Feeder roads lower priority than primary roads, low level of local participation (6, 18, C3, C4).	GOJ commitment indicated (G2-3, 13). Some strengthening of existing institutions. But better sustainability forecast if implemented by parishes not center.	Local planning/analysis strengthened, as was decentralized decision-making. Good sustainability but institutions need strengthening, more local involvement needed (12-14, 15, 16).	Good ARD organization now stabilized...tolerates local initiative...seen as a Thai program, strong permanent national institutional capacity for sustaining...rural development efforts (vii, 6).	GOH maintenance of larger access roads very good (3, 15-16). Local farmers repair shorter access roads. Sustainability good (B1). Substainability good (B1).	For RARs, development of process and agency for selection of roads. Commitment of officials and local citizens significant. Some question of whether selection at MOTC (or donor) level is very satisfactory (4-5, 17). Institutionalization failed in Vihiga projects (G3).

# ROAD CHARACTERISTICS

	Sierra Leone	Colombia	Liberia	Jamaica	Philippines	Thailand	Honduras	Kenya
A. Length (km) and type of new road	2 projects -- (1) 900 miles laterite feeder road; -- (2) 400 miles laterite feeder road.	59 penetration roads averaging 8 km each (which linked isolated villages to existing road network).	4 secondary roads totalling 155 kms. (2 projects)	181 miles of improved paved (asphalt) roads	Varying from 2 to more than 10 kms.	Over 15,000 km. all-weather dirt, penetration roads.	2 projects: --Old Directions--113.8 km. farm-to-market, all-weather feeders; --New Directions--304.1 km. all-weather access roads.	2 projects: --Vihiga--56.2 km. all-weather, gravelled, farm-to-market rural feeders; --RARS--1,000 km. farm-to-market access roads.
B. Nature of ecozone	Flat and rolling terrain, tropical forests, heavy rains in rainy season.	Mountainous.	Varied. Flat and rolling terrain, tropical forests, heavy rains.	Varied greatly. Mountains, swampy areas, dry areas.	Mostly flat to rolling terrain. Some irrigation.	In the North: narrow parallel valleys (wet). In the Northeast: rolling plateau (dry).	Varied ecozones.	Generally rolling terrain in highlands, and with two distinct rainy periods.
C. Completion date of new road	(1) 174 miles completed by FY 1977; (2) 140.3 miles completed by FY 1979.	Varied completion dates from those completed. 1 year to those still under construction.	First project (2 roads) completed 1971 and 1973. Second project ongoing.	About June 1977.	Implementation began in 1976. Some roads completed, others nearing completion.	5 years before impact evaluation.	Old Directions: FY 75. New Directions: FY 78.	Vihiga: 1976; RARS: ongoing (796.1 km. completed as of June 1980.
D. Type of old road	Dry season roads and cart tracks. Rural arterials.	Foot paths and animal tracks. Rural local roads.	Footpaths and dry season roads. Rural arterials.	Deteriorated gravel roads passable by vehicles. Rural collectors and arterials.	Deteriorated gravel and narrow tracks. Rural local roads, collectors and arterials.	Trails and cart tracks. Rural local roads and collectors.	Old Directions: Rural arterials. New Directions: Rural local roads and collectors.	Varied lengths of cart tracks and footpaths. Rural local roads and collectors.
E. Condition of old road	Bad condition--most only passable in dry season.	Impassable to mechanized traffic.	70% impassable to mechanized traffic; 30% passable in dry weather only.	All-weather roads in poor condition. Sometimes impassable in wet season.	Conditions varied considerably. Most passable to motorized traffic during dry season, some during wet season.	No all-weather access by car, bus or truck. All-weather access to motorcycles, bicycles, etc.	Dry-weather roads impassable in wet season.	Dry-weather roads impassable in rain; footpaths and cart tracks.
F. Zone of influence (time), new and old road	Not available.	Not available.	Not available.	Not generally available. Not seen as great due to small area and high number of roads.	Not available.	Not available.	Not available.	Varies from high of 400 to low of 100 ha/km.
G. Population in zone of influence, new and old road	Not available.	Not available.	About 100 persons per km.	High density.	Not available.	Not available.	Not available.	Varies from as few as 53 people/km. to as many as 504 people/km. of road.
H. Availability of uncleared or unutilized land (excluding fallow)	Not available.	Very limited.	Large areas of uncleared land.	Insignificant.	Limited in most sites.	Considerable uncleared land available in the Northeast. Deforestation of mountain slopes in the North.	Not available.	Only a few roads had. Unutilized (former pasture land) available.

# ROAD CHARACTERISTICS

	Sierra Leone	Colombia	Liberia	Jamaica	Philippines	Thailand	Honduras	Kenya
I. Concentration of Land ownership and type of land tenure	Traditional tenure arrangements.	Small plots (5-10 ha.) mostly owned by farmers.	Since roads, traditional tribal land tenure (with small farms) threatened by elite/wealthy land grabbers and government plantations.	Skewed; top 20 percent of landowners own 80 percent of the land.	Large plantations/estates in some areas. Progress in distributing land titles to small farmers, and in converting to written leases, is generally slow.	Small farm holders have tenure.	<u>Old Directions:</u> Most farmers large landholders. <u>New Directions:</u> Roads built to augment program for small landholders working in <u>asentamientos</u> .	Predominantly small landowners with some large landowners, absentee landlords and tenant farming.
J. Main non-agricultural economic activity, new/old road	Marketing, commerce.	None.	Marketing and commerce. Mining and logging.	Mining in a few areas.	Rice/corn milling; fishing in a few areas.	Some commuting for casual labor in towns.	Negligible except sugar milling, brick factory, and incipient roads contracting industry.	Labor intensive road construction.
K. Most important crops, new/old road	Rice, some cash crops (cocoa, coffee)	Vegetable crops, sugar and wheat.	<u>Export crops:</u> palm oil, rubber and cacao; <u>Cash crops:</u> bananas, yams, rice, etc.	Bananas, coffee, pimiento.	Rice, corn, coconut, sugar cane, fruits and vegetables.	<u>Old road:</u> tobacco, rice. <u>New road:</u> corn, soybeans, tobacco, cassava, kenaf, peanuts.	<u>Before roads:</u> corn, beans, bananas, sugar cane, coffee, sorghum, rice. <u>After roads:</u> sugar cane, corn, cotton, palm oil, citrus.	<u>After roads:</u> <u>Subsistence</u> —maize, millet, sorghum, casava, bananas, beans, legumes; <u>Cash crops</u> —coffee, tea, beans, cotton, sisa, sugar cane.
L. Effectiveness of social and health field workers and elementary school teachers, new/old road	Not available.	Available but do not serve isolated areas.	Extremely limited.	Primary health care and schools readily available.	Midwives travel to villages, but not significantly more often than before. In many area, however, doctors and nurses visit much more frequently.	Improved quality of schooling - greater availability of teachers.	Not specified.	Increased teacher access to areas served by roads. Social and health services less effective although beneficiaries perceive greater accessibility.
M. Availability of fertilizer, chemicals, technical assistance, credit, along new/old road	Generally inadequate.	Not systematically provided except in special areas with integrated programs.	Fertilizer not generally available, credit availability depends on locality, inadequate extension services.	Physical and capital inputs not readily available to small farmers because of downturn in economy. Agricultural extension similarly limited.	Variable. Increased visits by extension agents in a few cases. No apparent effect on credit availability. Improved access to fertilizer in some cases.	Not available before projects, but became generally available as ARD progressed.	<u>Old Direction:</u> limited except where INA stepped in. <u>New Direction:</u> inputs, credit, extension services more accessible.	Physical inputs generally available. Services inadequate.
N. Extent of integration of road with other rural development projects	Roads support IDA-funded integrated agricultural development projects.	None, except by happenstance.	Varied. In some instances roads part of other rural development programs.	Some roads tied to old land settlement schemes; but no real integration of ag services. Some linkage to water and electricity spread.	Almost none, except by happenstance.	Considerable. Roads were part of ARD project.	<u>Old Direction:</u> No effort to include other development needs. <u>New Direction:</u> Roads were part of integrated development project.	None at present though Vihiga formerly an integrated project.

## APPENDIX E

### RAPID APPRAISAL METHODS FOR RURAL ROAD PROJECTS

#### 1. Introduction

This paper will discuss two techniques, transport surveys and aerial surveys, that can be applied rapidly, are low in cost, and provide indicators of the economic impact and changes in personal mobility associated with rural roads projects. Typical information generated by these indicators includes an estimate of the economic feasibility of the road project, the distribution of the benefits generated by the project, changes in cultivation patterns and areas, population density in the zone of influence of the road, and characteristics of small village structures, such as tin roofs and larger huts.

Currently these tools are not extensively applied by AID. The reasons appear to be lack of familiarity with the procedures of transport surveys, lack of time for the advance planning that may be required to make the necessary arrangements for use of these techniques (traffic counts, for example, may have to be organized a few days before the impact team arrives in the field, and aerial photography will have to be located), and apprehensions that the cost of these surveys may be out of proportion to the small budget of the impact evaluation.

Though a comprehensive and full scale application of these survey techniques can indeed be quite costly and time consuming, the simple application of these techniques is well within the resources of an impact evaluation and is worthwhile doing.

#### 2. Transport Surveys

##### a. Information

This section will discuss two types of transport survey: the ordinary traffic survey consisting of traffic counts and origin/destination surveys, and the survey of the transport industry to explore its competitiveness. Traffic surveys provide useful indicators of the economic feasibility of the road project, the socioeconomic changes it made possible, and the distribution of the benefits. Transport surveys provide additional information on the distribution of the benefits, provide insight on the efficiency of the transport sector in providing services to the rural poor, and suggest ways to improve the efficiency of the transport industry, thereby reducing transport prices within limits commensurate with the road project.

##### b. Traffic Surveys

Traffic surveys of rural roads for the purpose of ex post evaluation can be simple and are far different from the comprehensive and expensive traffic surveys used in justifying and planning primary and secondary highway systems. Basically, our type of traffic survey counts and classifies small samples of the traffic flow on the rural roads to provide information on the number and types of vehicles using the roads, what commodities and how many passengers these vehicles carry, the ownership of these vehicles, from where they come, and where they go. Traffic counts provide a useful indicator of

the economic feasibility of the road, i.e., whether the benefits generated by the road from energy savings, savings of vehicle wear and tear, time savings, and increased agricultural production were sufficient to justify the cost of the road.

The simple traffic surveys used for the ex post evaluations of low-volume feeder roads consist merely of placing a few small two- or three-person teams along strategic places on a road to record the following:

- the average number of vehicles using the road during the day
- the vehicle mix, or distribution of the types of vehicles (cars, trucks, motorcycles, etc.) using the road
- the number of passengers and quantity of various commodities these vehicles carry

#### 1) Purpose of Traffic Counts

A new penetration road that has generated a lot of passenger and cargo traffic should be more "economically feasible" than a similar road carrying only a trickle of traffic. Similarly, an existing road that carries a lot of traffic would probably be a better candidate for upgrading than a comparable road with less traffic. However, the fact that a new or upgraded road carries a lot of traffic is not sufficient for the road to be economically feasible. Depending on factors such as type of terrain, weather, and cost of labor, not all roads need to carry large amounts of traffic to be economically feasible. In fact, some roads can be justified on the basis of very little traffic.

Section 4) (p. 14) derives two rules of thumb that indicate the approximate traffic levels required to economically justify new roads that enable the operation of mechanized vehicles over what were formerly footpaths and trails, and upgraded roads that are simply an improvement of an existing but badly deteriorated road. The construction method used may or may not be labor-based; the only really critical assumption made is that the project roads are regularly maintained. If they are not maintained, the rules do not apply. In fact, it is doubtful that any road project can be economically feasible if the road is not maintained.

For the new road project the rule of thumb is as follows:

$$Q^* = C/1300 \text{ vehicles per day}$$

where  $Q^*$  is the break-even traffic level, and  $C$  is the construction cost of the new road given in \$ per km.

For the upgraded road project the rule of thumb is:

$$Q^* = C/190 \text{ vehicles per day}$$



A few examples of the application of these rules may be instructive. Suppose we have a new road on which we observe, soon after the opening year, a traffic level of 60 vehicles per day. The count includes vehicles of all types including motorcycles (counted as one-third of a light vehicle), passenger cars, taxis, mini-buses, small pickup and medium trucks, etc. If the cost of the road project is \$50,000 per km, the rule of thumb prescribes that the level of traffic required for economic feasibility would have to be at least  $50,000/1300 = 38$  vehicles per day. Since the observed level of traffic is 60 vehicles per day, we can conclude that the road is well justified. For one of the new Kenyan roads built using labor-intensive methods at a cost of about \$8,000 per km in 1980, the break-even traffic level would be about six vehicles per day. And, for the upgraded Jamaican roads costing \$43,000 per km, the break-even traffic level would be about  $43,000/190 = 226$  vehicles per day.

## 2) How to Conduct the Spot Traffic Count

Counting the traffic is, in principle, very simple. It does require a little advance preparation for the transportation of local students or other workers who do the counting and interviewing. It is also helpful to have supervisors from the country's government organization responsible for traffic measurements to help supervise and set up the counts. They can be very helpful in supplying the materials needed for the count, in suggesting the best survey site locations, recruiting local enumerators, and analyzing the results.

The Manual on Traffic Surveys, (New York, United Nations, 1971, publication number E.71.II.F.13) gives a thorough and very readable presentation of the mechanics of traffic surveys as applied to developing countries, and provides good background reading. The spot surveys that we are concerned with are far less ambitious than the full-fledged surveys discussed in the UN report. The basic steps are the same, however, and consist of site selection, determining the duration of the survey, and processing the results.

### Site Location

For rural roads the best site location would be halfway between the end of the road (where the feeder road joins a secondary or other road) and the origin of the road. Traffic is usually heaviest near the end of the road and lowest at the beginning. By doing the traffic count at the halfway point we obtain a crude estimate of the average traffic on the road. Care should be taken not to locate the survey point close to towns, villages, or other local traffic generators near the halfway point. Local traffic is the traffic that only uses a small portion of the road and is not representative of farm-to-market traffic. A typical example of local traffic would be that between a small town and an agricultural research center located one or two miles away from the town. In such a case considerable local traffic is often generated by workers commuting from the town to the center, pickup trucks going to town to pick up mail or provisions, and supervisors going to lunch. Placing the

survey site between the research center and the town would result in inflated estimates of farm-to-market traffic. It is also best to have the traffic survey site sufficiently far from the center of towns and other built-up areas (about a mile or two) to avoid counting the spillover of urban traffic.

The need to place the survey site halfway down the road and well away from built-up areas means that transportation must be provided to get the traffic teams to their relatively isolated site, and pick them up.

### Manual Counting Methods

One or more enumerators are stationed alongside the road so that they have a good view of all the traffic that passes. It is strongly recommended that the team consist of at least two so that the reliability of the count is enhanced. The team is without supervision for long periods of time, and the job is boring. Along many roads the time spacing between vehicles may be an hour or more, and one vehicle every 15 minutes would be unusually heavy traffic. The site is usually remote from towns and stores, and unless the need for traffic data has been carefully explained to the enumerators and the need for accuracy stressed, there may be a lack of motivation. Frankly, the most crucial tasks in conducting traffic counts are to keep the enumerators awake and performing well. Two persons on the job has the effect, at least, of removing some of the tedium and allows enumerators to spell each other for occasional naps or other diversions.

The equipment needed comprises a watch (not absolutely essential), a supply of traffic count forms on a clipboard, and pencils. If the vehicles on roads with small flows of traffic are to be counted by illiterate observers, the pebble-and-can method can be used. A can is provided for the major categories of vehicles to be recorded, such as large can for buses and trucks, a medium can for pickups and vans, and a small can for cars and jeeps. If motorcycles are important, a fourth can must be included. A supply of pebbles is also provided, and for each vehicle that passes a pebble is dropped into the designated can. Supervision is especially important for illiterate enumerators. As noted above, enumerators may fall asleep or be distracted from the job in various ways, and a tendency has been noted for enumerators on isolated sites to add a sprinkling of pebbles to all their cans to show their supervisors that they have been on the job. Nevertheless, it has proven possible to obtain usable data by this method.

Figure 1 shows an example of a traffic count form used by the Ministry of Public Works in Liberia, and suitable for the low traffic volumes encountered on rural roads. One form is sufficient for a full day's count. Where motorcycles or other vehicles not shown on the form are important, these categories should be added.

### Duration of Survey

The spot survey can be as short as one day or as long as a week, depending entirely on the logistics and funding constraints of the project impact evaluation.

FIGURE 1: EXAMPLE OF A TRAFFIC COUNTING FORM

Ministry of Public Works Planning and Programming Bureau																	
VEHICLE CLASSIFICATION SURVEY FORM																	
POINT OF COUNT: <u>Station #3</u>				TIME BEGIN: <u>7 AM</u>				ENUMERATOR: <u>Emmanuel Yonty</u>									
DATE: <u>10/2/80</u>				TIME ENDED: <u>7 PM</u>				DIRECTION: <u>Buredra - Ficht Town</u>									
HOURL	PRIVATE CARS			TAXIS			PICK-UPS			BUSES		TRUCK (1)		TRUCK (2)		TRUCK TRAILER	LOGGING VEHICLE
7-8				I			III					II					
8-9	III	I		I			III			III							
9-10	II			III			III			I			I				I
10-11	I			I			III					I					I
11-12				I			III	I									
12-1							III										III
1-2	II						III							I		III	I
2-3	III						III					I				III	
3-4	III						III										
4-5							III										
5-6	I			I													
6-7							III										
	7			8			42			4		4		I		I	15

Truck(1) : 2-Axle  
 Truck(2) : 3-Axle Single Unit or more.

Ideally, the spot traffic survey should last three days, and from 6 a.m. to 10 p.m. As shown in Table 1, the 16-hour count will ensure that practically all the traffic moving on the road is counted. If it is not possible to conduct a 16-hour count because of budget problems or reluctance of the enumerators to stay out in the dark, a 12-hour count will still yield useful results. However, the 12-hour count will underestimate actual traffic and must be increased by an appropriate factor discussed below. In fact, a 10-hour count will still yield useful results but, though adjustment is possible, the estimate of traffic is less precise than for the longer count.

#### Adjusting the Traffic Estimate Derived From the Spot Traffic Survey

The first adjustment, that of converting the various types of vehicles ranging from heavy trucks to motorcycles into a "representative" vehicle, is done in Section 4). This leaves the second adjustment, that of allowing for the daily, weekly, and monthly variation in traffic.

Since the Average Daily Traffic (ADT) estimated from a one-, two-, or three-day survey is only a small sample of actual traffic, an important question is how representative is the estimate? Furthermore, what can be done to adjust the estimate so that it is more representative? A number of factors contribute to making traffic on feeder roads and other rural roads vary from hour to hour, day to day, and season to season. Of these, the most important are the variability in time of economic activity along the road, special days such as holidays and market days, and special factors such as road work, bad weather, and visits by important officials. To compensate for their influence, ADT estimated from the spot survey must be adjusted (or annualized) to yield the Average Annual Daily Traffic (AADT). The AADT is used in the rule of thumb for estimating the economic feasibility of a road.

As shown in Table 1, the hourly variation of traffic during a day on rural roads can be quite large. For most developing countries there is almost no mechanized traffic before 7 a.m. and after 12 midnight, but between 7 a.m. and 7 p.m. the traffic is fairly regular. We can use Table 1 to derive factors for adjusting the results of the less-than-24-hour traffic counts to represent full day counts. Since most of our roads will fall into the low volume category, with traffic less than 50 vehicles per day (vpd), the first column of Table 1 would be appropriate for deriving the adjustment factors. For example, if a 14-hour count is taken lasting from 6 a.m. to 8 p.m., the Table shows that 11 percent of traffic flowing between 8 p.m. and 6 a.m. will be missed. Thus, the actual traffic is larger than the sampled traffic by a factor of 1.12 (calculated by dividing 100 by 89). Therefore, if, for example, the sampled traffic is 20 vpd, the 24-hour traffic would be  $24 \times 1.12 = 27$  vpd.

The seasonality of traffic may be large for some countries and regions, and almost non-existent for others. Seasonality data for three typical countries are given in Table 2, which shows the monthly variation in traffic for rural roads in Panama, Jamaica, and at a border crossing between Niger and Upper Volta.

**Table 1: Hourly Traffic as a Percent of Daily Traffic for  
Rural Roads in Panama**

Hour of Day	Traffic Range of Road, Vehicles Per Day				
	0 - 50	50 - 150	150 - 500	500 - 1500	over 1500
0 - 1	0	1	1	1	1
1 - 2	0	0	0	0	1
2 - 3	0	0	0	0	0
3 - 4	0	0	1	0	0
4 - 5	0	0	1	0	0
5 - 6	0	1	2	2	1
6 - 7	0	1	1	5	1
7 - 8	7	8	3	8	4
8 - 9	7	10	6	9	8
9 - 10	10	8	7	8	8
10 - 11	5	9	9	8	7
11 - 12	5	6	13	7	5
12 - 13	4	7	8	7	7
13 - 14	5	7	5	8	5
14 - 15	4	6	5	7	7
15 - 16	8	6	7	8	5
16 - 17	11	3	4	6	9
17 - 18	5	13	7	5	6
18 - 19	18	7	6	4	7
19 - 20	2	5	5	2	8
20 - 21	1	1	3	0	4
21 - 22	4	0	4	2	3
22 - 23	3	1	2	2	2
23 - 24	1	0	0	1	1

Table 2: SEASONAL VARIATIONS IN TRAFFIC ON RURAL ROADS

$$\text{Ratio} = \frac{\text{Traffic in Month}}{\text{Traffic in Average Month}}$$

Month	Sabánitas	Chorrera	Panama	Pasco Canoa	Hope Bay	Jamaica	Browns Town	Upper Volta/Niger
January	1.12	.96	.91	.91	.91	.98	.92	.95
February	1.26	.98	.81	.99	.98	.98	.92	.90
March	1.12	.93	.80	.91	.91	1.11	.92	1.25
April	1.14	.94	1.13	1.08	1.08	.98	.92	1.40
May	1.17	.99	1.67	1.73	1.08	.91	1.01	1.10
June	1.11	.98	1.90	.90	.99	1.04	1.01	.95
July	1.00	.90	.90	.90	.99	.98	1.11	.70
August	.91	.98	1.25	1.50	1.08	1.04	1.20	.80
September	.89	1.08	1.44	1.50	.99	.98	1.01	.75
October	.87	1.12	.84	.84	.99	.98	1.01	1.20
November	.83	1.13	.53	.53	.91	.98	1.01	1.35
December	.82	1.08			1.08	1.04	.92	
	1972	1972	1972	1972	1968	1968	1968	1973
	Nlamey-Fada N'Gourma							

The seasonality of traffic on the Paso Canoa road in Panama is quite high. Expressed in terms of the observed monthly traffic divided by the average monthly traffic, the flow varies from a low of .53 for the month of December to a high of 1.73 for the month of June. Thus, for some months the traffic can vary from one-half to almost double the average monthly traffic. The seasonality for the roads in Jamaica is very low, with the traffic for any month being within about 10 percent of the average monthly traffic. In a country such as Jamaica, therefore, one would not have to make adjustments for seasonality unless a degree of precision were required far in excess of that demanded by our rapid appraisal study. For Upper Volta/Niger the seasonality of traffic is moderate, with the traffic in the lowest month being about 30 percent below the average monthly traffic and with traffic in the highest month being about 40 percent above the average monthly traffic.

Without any information on seasonality there is a chance that the observed traffic from the spot survey might be substantially above or below the actual monthly traffic. When seasonality is pronounced, the local population and transport industry will be well aware of which months are high or low. This source of information can be tapped to adjust the observed traffic counts to be more representative of the average traffic. Also, the government bureaus involved with transportation often conduct traffic counts and can supply information on seasonality of traffic as presented in Table 2. This type of information, if applicable to the region in which the road is located, is the best source for adjusting the traffic counts. Care must be taken, however, to insure that the information is representative of traffic on small rural roads and not on primary or secondary highways.

Traffic also varies from day to day within the week. (Week-to-week variation within the month is small and may be ignored.) Table 3 presents this variation for rural roads in Panama. The daily variation of traffic is expressed as a percentage of the total weekly traffic. For low volume roads with traffic of less than 50 vehicles per day, it can be seen that, for Panama at least, Sunday and Monday traffic is considerably lower than that for the rest of the week, and Friday traffic is somewhat higher. For the next higher traffic volume category (50-150 vehicles per day), Sunday is still the lowest traffic day, with Friday and Saturday having the highest traffic. However, some experimenting with these figures will show that three-day traffic counts, even if they include a low or high day, produce an average that is sufficiently close for our purposes to the actual average traffic for the week. Therefore, three-day counts may be simply averaged to obtain an estimate of the average traffic for the week. For one or two day counts it is best to exclude known low- or high-traffic days. Since week-to-week variation within the month is small, the average daily traffic for the week can also be taken as the estimate of the average daily traffic for the month. The seasonality adjustment must then be applied to provide the estimate for the AADT. The example below may be useful in understanding the traffic count adjustment process.

Suppose a two-day count was conducted in the month of July, yielding 25 vpd on the first day and 30 vpd on the second. The counts were conducted from 6 a.m. to 6 p.m. (12 hours). Neither of these days included a Sunday or market day, and the estimate of the average daily traffic for that week and

Table 3: Daily Variation of Traffic on Rural Roads in  
Panama as Per Cent of Weekly Traffic

Day of Week	Traffic Range, Vehicles Per Day				
	0-50	50-150	150-500	500-1500	over 1500
Monday	11	16	14	13	15
Tuesday	14	12	14	15	14
Wednesday	15	13	15	13	13
Thursday	15	14	13	12	14
Friday	18	18	16	13	15
Saturday	16	18	13	17	15
Sunday	11	9	15	17	14



month is simply  $(25 + 30)/2 = 27.5$  vpd. Suppose that from the Ministry of Works we obtained information that traffic in the month of July is characterized by being 20 percent higher than the average annual daily traffic. Our ADT must therefore be adjusted by dividing the 27.5 vpd by 1.2 to yield an AADT of 22.9 vpd. Finally, we must increase this by 30 percent to compensate for the fact that traffic was counted for only 12 hours instead of all day. Thus, the final estimated AADT would be about 30 vpd.

### Analysis

Once we have the AADT that is used to yield an estimate of the economic feasibility of the road, the only further analysis needed for the impact evaluation is the vehicle classification.

### 3) How To Do the Classification Count

The traffic counts already give some information on the various types of vehicles that are using the road. This information is not sufficient, however, to determine who the road users are and how the benefits from the road are shared between the rich and the poor. For example, the traffic count may indicate that a large number of pickup trucks are using the road. But are these trucks owned mostly by large farmers, by the government, by small owner-operators dealing in farm products, or by industrial estates? What do these pickup trucks carry? Does their payload consist of products from small farms, or plantation products? Are the passengers mostly low income or are they rich? It is only with this type of information on road usage that a judgment can be made on who the beneficiaries are. Development of such information is the objective of the passenger and cargo classification counts.

Care must be taken to keep the classification as simple and modest as possible. It is tempting to collect detailed information on vehicle ownership, income groups of the passengers, and employment of the driver. This information is valuable but too much time is required to train interviewers to collect it, prepare the forms that need filling out, and do the data analysis after the survey is completed. For purposes of the impact evaluations the data collection should be kept at the lowest possible level. And, despite the simplicity, we will see that the data collected can provide valuable indicators of road use.

The basic information gathered for each vehicle type consists of 1) the number of passengers of low income and of higher income in the vehicle, 2) the approximate weight of cargo carried from small farms, and 3) the approximate weight of cargo carried from large farms or large commercial enterprises. Table 4 indicates a format for the field data sheet.

### Siting and Duration of the Classification Survey

The same criteria that apply to the site selection and duration of a traffic count also apply to the passenger and cargo classification count. Thus, the classification enumerator can be combined with the traffic counting team.

Table 4: Example of Field Data Sheet for Classification Count

<u>Vehicle Type</u>	<u>No. of low income passengers</u>	<u>No. of medium and high income passengers</u>	<u>Wgt. of ag. product from sm. farms (kg.)</u>	<u>Wgt. of cargo from lg. farmers and commercial enterprises (kg.)</u>	<u>Notes</u>
small pickup	14	0	500	0	commercial operation
small pickup	12	0	0	0	pickup belonging to lg. plantation transporting hired labor
motorcycle	0	1	0	0	government extension worker
jeep	0	3	0	200	jeep belonging to lg. plantation
small pickup	21	0	200	0	commercial operation
passenger car	0	2	0	0	Mercedes Benz belonging to plantation manager
medium truck	0	0	2500	0	truck belonging to rice mill
heavy truck	6	0	0	12,000	logging truck

Day: February 18, 1980  
 Enumerator: Emanuel Yorty  
 Road: Zwedru-Ziah Town  
 Location: Station #3  
 Time: 7 a.m. to 7 p.m.

### Personnel Requirements

For roads with light traffic, 2 to 3 vehicles per hour or less than 30 vehicles per day, one classification enumerator can check all the traffic. For higher traffic levels it may be necessary for the classification enumerator to check only a sample of the traffic. This is not a disadvantage. The sample will be representative of all the traffic on the road if the vehicles are stopped and interviewed at random. Thus, one classification enumerator will suffice.

An important person to include in the passenger and cargo classification count is the local policeman, or other person with the authority to stop vehicles. Experience has shown that survey team members are rather intimidated by mechanized vehicles and only the most cooperative or curious drivers will stop for them. Furthermore, there is also a safety consideration since inexperienced persons can easily get hurt.

The training of the interviewers will be eased if the candidates have enough intelligence and background to understand that the purpose of the survey is to get an impression of who the road users are. Are the road users rich or poor, small farmers or large, powerful farmers? Since the candidate will have to judge the general income level of the passengers found in each vehicle, he must be very familiar with the characteristics of dress and behaviour of the local population that provide clues to their income bracket. In the Liberia impact evaluation the local policeman assisting in the survey was very knowledgeable and helpful. More mature high school students also appear capable of doing this difficult work, but wide margins of error should nevertheless be expected in the classification of income groups.

The interviewer should also have enough familiarity with agriculture to quickly estimate the total weight of the assorted bundles of agricultural products tied to the roof of the vehicle or carried on the laps of the passengers. Estimating the weight of the product carried by the larger trucks is usually not a problem since it is almost always given by the driver.

### Analysis

A basic analysis would consist of adding the total number of low-income and higher-income passengers and the total weight of agricultural products from small farms and from larger farms and commercial enterprises. These data would then provide an indicator of who the beneficiaries are. Thus, if 80 percent of the passenger flow consisted of low-income persons, and 75 percent of the cargo flow consisted of products from small farms, one could be quite sure that the road benefited the lower income groups and small farmers. On the other hand, if 75 percent of the cargo flow came from large plantations, it would be the larger farmers that benefited.

Note that the passenger and cargo classifications do not include pedestrians and animal transport. Though this traffic can be very important on certain roads and is an indication that mechanized traffic is beyond the economic reach of the rural poor, it is not necessary to include it in the

survey of passenger and cargo classification counts. This foot and animal traffic is not a beneficiary of the road project. This traffic existed before the road was improved, and the fact that such traffic did not switch to mechanized transport indicates that it is not a beneficiary of the road transport. Had they switched, they would have been a beneficiary and would have been automatically included in the passenger and cargo classification survey.

#### 4) Derivation of Rules of Thumb for Judging the Economic Feasibility of Feeder Road Projects as Based on Traffic Counts

The amount of traffic using a newly constructed or rehabilitated feeder road is a useful indicator of the economic feasibility of the road project, i.e., the extent to which the economic benefits of the road project exceed the project cost. Economic feasibility is usually expressed as a benefit/cost ratio, rate of return, or net present value. It does not measure income distribution, equity, and other important considerations in assessing the impact of projects. Nevertheless, the concept of economic feasibility is an important one. Unless the economic benefits of a project exceed economic costs, the economic growth objective is not achieved, and the country is likely to be faced with a worsening balance of payments, a deteriorating economy, and a less manageable debt service schedule. This outcome does not improve the welfare of the rural poor.

The number of persons that use the road and the tonnage of the commodities that are transported over the road are good indicators of the economic feasibility. For example, the roads surveyed in Liberia carry high levels of traffic and clearly satisfy a strong demand for personal and cargo transportation. On the basis of road usage, they are more feasible than the Jamaican and Kenyan project roads that carried very little traffic. The challenge lies in defining that level of traffic (the break-even traffic level) that indicates economic feasibility. For some roads this traffic level may be quite high. For other roads that break-even level could be much lower.

In this section we will derive a simple rule of thumb enabling a judgment to be made on the economic feasibility of a rural road project. Two rules of thumb are needed, one for a newly constructed feeder road making motorized traffic possible where there was only animal traffic or human portage before, and one for a road project consisting of the rehabilitation of an existing road. The only information required to apply these rules of thumb is an estimate of the traffic level and a rough idea of the construction costs of the road. Using parameters derived from various well-studied road projects, all the other considerations, such as the maintenance cost of the road, the increased agriculture production resulting from the road, vehicle operating cost savings, the opportunity cost of capital, and the useful life of the road can be factored into this rule of thumb.

The direct economic benefits generated by a road project are measured by increased agriculture production, reduced travel time, lowered fuel consumption and wear and tear on the vehicles, and lower maintenance cost. In the usual project appraisal a great deal of effort is placed in estimating these

values. There is no time for all these calculations and data collection during short (about three weeks) project impact evaluations. Instead, we rely on economic theory, which states that the economic benefits of a road project can be derived from either the changes in consumer and producer surpluses (similar to the value added approach) or from road user savings measured by changes in the area under the transport demand curve. (See for example Paul A. Samuelson, "Spatial Price Equilibrium and Linear Programming," American Economic Review, June 1972.) Since it is easy to measure the existing traffic after the road is constructed, the road user savings approach is much easier to apply than procedures that depend on estimating increased agricultural production and changes in consumption made possible by the road project.

The measure of benefit as defined by the change in area under the transport demand curve is derived from economic models that are abstractions of reality and therefore subject to the charge of oversimplification. Nevertheless, the procedures followed in deriving the rule of thumb are sufficiently realistic to ensure sufficient accuracy for application in the field. In addition, any errors introduced by using the approximate method will work toward making the results conservative. For example, after a new feeder road is constructed, there is a substantial shift of the transport demand curve to the right because of the much higher service levels offered when motorized transport replaces animal transport. This shift to the right increases consumer surplus. However, this increase is ignored in our derivation of the rule of thumb. Thus, in applying the rules of thumb we are more likely to reject an economically feasible road than to accept an economically infeasible one.

#### Rule of Thumb for New Roads

The basic assumptions used for deriving the rule of thumb are as follows:

1. The new road is a good, all-weather, gravel road, and replaces a track not suitable for motorized transport.
2. The construction cost of the road (C) is included in the rule of thumb, but ranges between \$8,000 and \$65,000 per km depending on the terrain, climate, design standards, and type of construction.
3. The lifetime of the road is 20 years, and the road has no salvage value.
4. Periodic maintenance on the road is performed every seven years. The cost of this maintenance is equal to 50% of the initial construction cost, i.e., if construction cost is \$65,000 per km, the periodic maintenance cost is \$32,500 per km in the 7th and 14th years.
5. Routine maintenance on the new road is performed each year except the 7th and 14th at an annual cost of 2.5% of the initial construction cost, i.e., the annual maintenance cost for the road would be \$1,625 per km.

6. The road is gravel surfaced with good drainage and with a 15- to 20-foot-wide travelled way. One-lane bridges are provided.
7. The old track is not maintained.
8. Traffic volume on the old track is small and consists of pack animals, animal-drawn carts and sleds, human porters, and other non-mechanized travel. Travel times and transport costs on the track are about eight times higher than by motorized traffic on the new road.
9. On the new road the operating cost for a representative vehicle (35% cars and taxis; 46% pickup trucks, vans and other medium-sized vehicles; and 19% medium 7-ton-capacity trucks) is 22.74 cents per vehicle kilometer, or \$83.00 per year per vehicle kilometer. This is 87.5% less than animal transport on the track.
10. The opportunity cost of capital is 15%.
11. After the opening year, traffic on the new road stays constant, i.e., after the quantum increase in passenger and cargo traffic resulting from the improved access, there is no further traffic growth after the opening year. It should be noted that the assumed maintenance costs are ample. In addition, the assumption of no traffic growth tends to underestimate benefits.

The equation for calculating the annual benefit of the road project for each year of its life is given as (see: van der Tak and Ray, The Economic Benefits of Road Transport Projects, Baltimore, Johns Hopkins Press, 1971):

$$B = 1/2 (Q_1 - Q_2) (U_1 - U_2)$$

where B = annual benefits in \$/km

$Q_1$  = traffic in vehicles per year without the improvement

$Q_2$  = traffic in vehicles per year after the improvement

$U_1$  = vehicle operating costs in \$ per vehicle kilometer before the improvement

$U_2$  = vehicle operating costs in \$ per vehicle kilometer after the improvement

Table 5 gives the time stream of the costs and benefits for the new road. The costs of the project consist of the sum of the construction cost and the present value (PV) of the time stream of the maintenance cost discounted at 15%. For a 20-year time stream where the construction cost is C, the annual routine maintenance cost in the 7th and 14th year is .50 C and the present value of the time stream of periodic and routine maintenance costs is .40 C.

The value of the benefit for the year the road is opened is:

$$B = 1/2 (Q_1 + Q_2) (\$664 - \$83)$$

$$= 290.5 Q_2 \text{ dollars}$$

We will make the conservative assumption that the traffic on the unimproved track is zero, i.e., there is no "normal" traffic; all traffic is "generated" traffic.

The present value of the 20-year time stream of benefits is  $6.25 \times B$ , or 1818  $Q_2$  dollars. In order to calculate the break-even value of traffic where the present value of the benefits just exceeds the present value of the costs, we must solve the equation:

$$1818 Q_2 = .40 C + C$$

or

$$Q^* = C/1300 \text{ where } Q^* = \text{break-even traffic level in vehicles per day.}$$

For example, if the construction cost of the road is \$65,000 per kilometer, a traffic level observed on the opening year of 50 vehicles per day or more would indicate with considerable confidence that the road is economically justified. If only 15 vehicles per day were observed in the opening year, then the road cost should not exceed \$19,500 per km in order for us to be reasonably confident that the road is economically justified.

The rule of thumb given by the above equation is quite sensitive to the annual growth of traffic. Though we have assumed that traffic growth is zero, replacing this assumption by a 5% annual traffic growth over twenty years would decrease the break-even traffic level by about 25%. Thus, if the road construction cost were \$65,000 per km, the break-even traffic level would have to be only 37 vehicles per day, instead of the 50 vehicles per day given by the rule of thumb where no traffic growth is assumed. Ignoring possible traffic growth is an assumption leading to conservative conclusions.

#### Rule of Thumb for Rehabilitated Roads

Rehabilitated roads differ from new roads in that they replace existing roads. Though accommodating mechanized vehicles during the dry season, these deteriorated roads are of poor quality, impose high wear and tear on the vehicles operating over them, and force vehicles to travel at slower speeds. Nevertheless, despite their poor condition the existing road enables the operation of mechanized vehicles, offering a service level higher than that for animal tracks and foot paths. For this reason the effect of rehabilitating an old road is not felt as strongly by the rural population as building a new road. Though rehabilitated roads cause transport costs to drop, travel times to decrease, and reliability of service to improve, these changes are not large enough to cause marked increases in agricultural production or passenger travel. Rehabilitated roads do not "generate" new traffic but

Table 5: Time Stream of Costs and Benefits for the New Road  
for a Traffic Level of One Vehicle per Day

year	<u>Annual Road User Cost</u>		<u>Costs, \$/kilometer</u>	
	\$ /veh. kilometer		<u>construction</u>	<u>maintenance</u>
	<u>without project</u> (U <sub>1</sub> )	<u>with project</u> (U <sub>2</sub> )		
0	0	0	C	0
1	664	83		.025 C
2	664	83		.025 C
3	664	83		.025 C
4	664	83		.025 C
5	664	83		.025 C
6	664	83		.025 C
7	664	83		.500 C
8	664	83		.025 C
9	664	83		.025 C
10	664	83		.025 C
11	664	83		.025 C
12	664	83		.025 C
13	664	83		.025 C
14	664	83		.500 C
15	664	83		.025 C
16	664	83		.025 C
17	664	83		.025 C
18	664	83		.025 C
19	664	83		.025 C
20	664	83		.025 C



reduce the cost of the existing. For this reason the derivation of the rule of thumb for rehabilitated roads is different from that for new roads. The basic assumptions are:

1. The rehabilitated road is a good, all-weather, gravel road replacing a deteriorated and poor road that is not all-weather.
- 2, 3, 4, 5, and 6 are the same as for the "new" road.
7. The existing road is not maintained. If it were, rehabilitation would not be necessary. Instead, the road is allowed to deteriorate until it is necessary to patch the road every seven years at a cost of  $kC$ , where  $C$  is the cost of rehabilitation and  $k$  is a constant of proportionality. The patching is of lower quality than the rehabilitation. A typical value for  $k$  might be .60.
8. Traffic volume on the unimproved road is the same as on the rehabilitated road.
9. On the rehabilitated road the vehicle operating cost for a representative vehicle is 22.74 cents per vehicle kilometer, the same as for a new road. For the unimproved road the vehicle operating cost is 30.12 cents per vehicle kilometer in the year after patching, but because of lack of maintenance it then rises linearly to double (60.24 cents per vehicle kilometer) just before the road needs patching again.
10. The opportunity cost of capital is 15%, the same as for the new road.
11. Traffic on the rehabilitated road exhibits no traffic growth.

Table 6 shows the time stream of benefits and costs for the road rehabilitation. The equation for calculating the annual benefit of the road project for each year is of the same form as that given for the new road, but the values of the variables are different. Since the traffic levels before rehabilitation are the same as the traffic levels after rehabilitation,  $Q_1$  equals  $Q_2$ . The vehicle operating cost after rehabilitation,  $C_2$ , stays constant for each year since the road is well maintained. However, the vehicle operating cost for the patching,  $C_1$ , will go up each year because of the gradual deterioration of the road resulting from the "no-maintenance" policy.

We assume that in the "without" project the road is patched every seven years starting with the first year. For the first year  $C_1 = \$110$  per vehicle kilometer per year. By the seventh year  $C_1$  will have increased to \$220 per vehicle kilometer per year.

The present value of the time stream of the constant road user cost for the with-project case is \$520 per vehicle km. For the without-project case the present value of the "sawtooth" shaped time stream of vehicle operating costs is \$966 per vehicle km.

Table 6: Time Stream of Costs and Benefits for the Rehabilitated Road  
(With Project) as Compared with the Without Project Case

Year	Without Project		With Project		
	Cost of "Patching" (\$/km)	Road User Cost $U_1$ (\$/veh. km)	Rehabilitation Cost (\$/km)	Maintenance Cost (\$/veh. K.)	Road User Cost $U_2$ (\$/veh. km)
0	kC	0	C	0	0
1	0	110	0	.025 C	83
2	0	128	0	.025 C	83
3	0	147	0	.025 C	83
4	0	165	0	.025 C	83
5	0	183	0	.025 C	83
6	0	202	0	.025 C	83
7	kC	220	0	.500 C	83
8	0	110	0	.025 C	83
9	0	128	0	.025 C	83
10	0	147	0	.025 C	83
11	0	165	0	.025 C	83
12	0	183	0	.025 C	83
13	0	202	0	.025 C	83
14	0	220	0	.500 C	83
15	kC	110	0	.025 C	83
16	0	128	0	.025 C	83
17	0	147	0	.025 C	83
18	0	165	0	.025 C	83
19	0	183	0	.025 C	83
20	0	202	0	.025 C	83

The present value of the construction and maintenance cost for the with-project case is  $1.4 C$ . For the without-project case the present value of the costs of patching up is  $1.517 kC$ .

The break-even traffic rate,  $Q^*$ , can be determined by equating the present values of the with- and without-projects as given in the following:

$$1.4 C + 520 Q^* = 1.52 kC + 966 Q^*$$

or

$$Q^* = \frac{1.4 - 1.52k}{446} \times C \quad \text{vehicles per day}$$

If the engineers can estimate a value for  $k$  (the cost of patching up the road expressed as a fraction of the cost of rehabilitation), the above equation can be used directly. Where it is not possible to obtain an estimate of  $k$ , a value of .60 is generally applicable and results in a break-even traffic level given as:

$$Q^* = C/910 \text{ vehicles per day}$$

where  $C$  is the cost of rehabilitating the road.

If  $C$  is \$50,000 per km, an observed traffic level exceeding 55 vehicles per day indicates that the project is economically justified.

## 5) Survey of the Transport Industry

The passenger and cargo classification survey discussed above gives a good clue on the division of the benefits from the road project between the small farmers/low-income groups and the large farmers/high-income groups. Thus, if most of the passengers are from the low-income groups, and most of the cargo consists of crops farmed by small farmers, these groups have indeed benefited most from the road project. But there is another important group that we have not yet analyzed, the operators of the transport vehicles. Including that group will provide further insight into the distribution of benefits between the small farmers and the vehicle operators.

### Purpose of the Transport Industry Survey

The basic purpose of the survey is to find out whether the savings in transport cost made possible by the road project are passed on to the road users or whether these savings are retained by the transport vehicle operators. Since the transport operators represent the higher-income groups in a rural economy, the project intent usually is that savings be passed on to the users rather than be retained by the operators. From the economic point of view it is more efficient if these savings are passed on, thereby causing the tariffs and fares to more closely approach the marginal vehicle operating costs and promoting optimum utilization of resources.

### How To Do the Transport Industry Survey

Depending on the amount of information of fare levels and vehicle operating costs already available in the country, there are two possible approaches to assessing to what extent transport cost savings are passed on to the users.

These two approaches are complementary, provide valuable cross checks, and should both be followed if time permits. If operating cost data for passenger vehicles are available for the project roads or similar roads, we can apply Method I, which consists of a simple comparison of passenger fare and vehicle operating costs. For freight transport where data on vehicle operating costs are not available, Method II estimates the competitiveness of the transport sector.

#### Method I

Though in principle, this method can be applied to both passenger and freight transport, the task for freight transport is too difficult to be done within the resources available for an impact evaluation. The basic procedure is to compare the vehicle operating cost between two points with the average revenue collected by the vehicle operator for that route. The average revenue is the product of the fare times the average number of passengers per vehicle. If the revenue and vehicle operating costs are close, the vehicle operator is passing on the savings in transport cost.

The procedure is simple but there may be large uncertainties associated with the data on vehicle operating costs and average load factors. Therefore, Method I must be used with caution and, wherever possible, Method II should be used as a check.

Vehicle operating cost information that applies to the project roads and that is current enough so that it does not have to be adjusted for inflation is often available from studies done by a consultant on the AID or other road projects. A good source to check is a recent World Bank or other donor appraisal report on a rural road project for the particular country. Another good source is the Ministry of Public Works or other agency involved in implementing rural road projects. Passenger fares and vehicle occupancy data are best collected in the field by interviewing the road users and vehicle operators, and from the traffic counts and passenger classification surveys.

The derivation of vehicle operating costs is complex and involves a number of assumptions on useful vehicle life, depreciation rates, and other factors that can introduce significant errors if done without care. This leaves room for mistakes, and we must carefully check the source of the operating costs to make sure that it is reasonably accurate. The vehicle operating costs provided in World Bank appraisal reports and the more recent AID project papers are usually of good quality.

Where the vehicle operating costs and the fare levels are not for the same year, an adjustment must be made for inflation. If the consumer price

index is used (the only practical method available within the constraints of the impact evaluation), this adjustment will not compensate for the higher rate of inflation of fuel, one of the most important components of the vehicle operating costs, and will therefore underestimate the true vehicle operating cost. For the purposes of the impact evaluation the accuracy will be sufficient.

Vehicle operating cost tables give both financial and economic (shadow) cost, but only the financial costs are appropriate for our purpose of comparing costs and revenues. Financial costs include taxes and other elements left out of economic vehicle operating costs.

When calculating revenue, one of the most critical factors is the average load factor. This is measured as an average factor over a period of time, such as a week, in order to reduce short term fluctuation that might be expected from hour to hour during the day, and from day to day during the week. The traffic counts and passenger classification provide the basic data for estimating the average load factor.

We should also try to include the revenue from the various bundles, baskets, and other cargo that are carried by the passengers in mixed passenger/freight vehicles. Analysis of the passenger and freight classification data can provide an estimate of what this revenue might be. Method I is not recommended for application to freight transport because it is very difficult to estimate an average load factor for pure freight vehicles such as trucks. Load factors for freight vehicles are more variable than for passenger vehicles because freight vehicles often travel empty, or almost empty, during the backhaul. For passenger vehicles or mixed freight/passenger vehicles the variability between the forhaul (i.e., from the village to the town) and the backhaul (from town back to the village) is small because of the balanced two-way flow of passenger traffic.

## Method II

If it is not possible to apply the first method because of lack of data on vehicle operating costs or other reasons, Method II can be applied. This consists of estimating the competition among the vehicle operators over the project road through direct interviews with the passengers, shippers of freight, and the vehicle operators themselves. If competition is high, we may infer that the prices charged for transport are near the costs and that savings in transport costs are passed on to the users.

For rural roads it is not difficult to assess the extent of competition in the transport industry. It can be done through observation and by interviewing vehicle operators, passengers, shippers of goods, and also the non-users of transport. The basic question that must be answered is how much can an individual vehicle operator control the price of his transport service? Can he charge "what the market will bear," or must he accept the price set by the market as something he cannot change?

If there is little competition, the operator can charge what the market will bear, i.e., he can adjust the price of his fare to maximize his revenue, even though this price may discourage some travellers and other potential users from using his service. Thus, there are travellers and goods that are left behind (or walk) and that would have taken the vehicle if the price had been lower. On the other hand, with adequate competition, he is a "price taker," i.e., he cannot arbitrarily increase the price of his fare above that set by the other operators on the road. If he were to increase his price, his potential customers simply would wait for the cheaper service to come along.

In interviewing vehicle operators the following key questions should be kept in mind:

1. How easy is it for an individual to start a transport service on this road or in this region?

In general it is conducive to competition if it is easy for an individual to start such a service. Institutional factors that may make entry of a new service difficult include driver associations that limit membership or government regulations that limit the number of vehicles that can offer transport services. The former are usually not a problem. The latter is also usually not a problem on small rural roads, though transport services on the larger secondary and primary roads are often severely limited by government regulations. Often, passenger transport on such roads is a government monopoly. Another important factor that may make entry of new transport operators difficult is the very high cost and the inconvenience of obtaining a new vehicle or of keeping it running. In Kenya for example, the cost of vehicles is very high because of import duties, and there can be a year's wait between the time of application and of approval. In Liberia, for the newest roads, the supporting infrastructure for transport operators (gasoline pumps, spare parts stores, and repair shops) is not yet in place. In these environments entry is limited to only those drivers with good connections with financiers and other patrons.

2. Are the fares controlled by the government?

Most countries regulate the passenger fares, and sometimes the fare for freight. If such regulation is strictly enforced, one cannot speak of a competitive environment. The transporters will leave the poor quality, low-demand roads where they cannot make any money and operate exclusively on roads where demand is sufficiently large to make transport profitable. On those roads the transport industry will operate inefficiently, well below its most economical operating point. Much of the savings generated by the road project will go neither to the rich nor the poor, but will be dissipated as waste.

Government fare regulations are almost never enforced in remote areas, thereby making competition possible. Furthermore, some countries only regulate the maximum fare and allow competition below that level. This type of regulation is not harmful to competition, though if such maximum fare is set at too low a level, the poor quality roads in low-demand regions will again be ignored by the transport industry.

Provided they are not too busy, vehicle operators and owners are generally very cooperative in providing information and are quite happy to talk about the many aspects related to competition. A good time to interview them is when they are driving a vehicle. The worst time is while they are loading goods or passengers. During the impact evaluations, interviews of vehicle operators at busy markets never worked out very well. A good procedure is to conduct the interview as a fare paying passenger in as many of the for-hire vehicles as possible. Since most vehicle operators only speak the regional dialect, local interpreters (high school boys or girls will do) are mandatory.

Good questions to ask when interviewing passengers, shippers of goods, and non-users are the following:

1. How often during the day do vehicles pass by to offer transportation services? Do they all charge the same price? If you don't like the price requested by one operator, would you wait for the next one or would that take too long?

Provided fares are not excessively regulated, a high service frequency is generally conducive to competition because it implies that many suppliers are vying for the same market. Charging the same price is another indicator of good competition, provided the prices are not fixed and enforced by the government. Finally, a service level that is high enough so customers can wait for the next vehicle if the price charged by one of the vehicles is out of line also indicates satisfactory competition.

2. Do the vehicle operators charge the same price for transporting the various agricultural products?

Where there is adequate competition one will generally find that transporters charge the same price for all agricultural products, regardless of the value of the product. Where competition is poor, the operators will charge a higher price for the higher valued product than for low-priced staples. With inadequate competition operators will charge what the traffic will bear. Shippers of high-value products are then forced to give up a substantial amount of their profit margin to the transporter by paying a higher transport price.

3. How do today's transport prices compare with the prices before the road was upgraded?

This question applies to upgrading only. If the transport prices after the road was upgraded did indeed go down, this would be good evidence that transport cost savings are passed on to the customers. The question is confounded, however, because of recent high inflation rates and rapid rises in price of fuel in developing countries. Even with the road improvement, the prices after improvement often can be higher than before the improvement. In such cases, it may be possible to use the known inflation rate to adjust the ex post price and to estimate the increase in the real cost of transportation.

### c. Aerial Photography Analysis

As demonstrated by the Honduras and Liberia road impact evaluations, aerial photography can make a valuable contribution to quantifying and understanding changes in land use, urban patterns, and other economic activity that follows a road project. Such analysis consists of comparing aerial photographs of a road's zone of influence taken before the road project started with photographs taken a year or more after project completion. Furthermore, since the aerial photo coverage is often sufficiently broad to enable areas where no road improvement took place to be included in the analysis, causal relationships can be inferred between observed changes in economic activity and the road improvement.

The main obstacle impeding the neophyte in the use of aerial photography is the difficulty in identifying and obtaining suitable photographic coverage of the zone of influence of the road. Another problem is lack of information on how and where to get the photography analyzed and the cost of the analysis. Finally, there might be some lack of appreciation of the value of the technique. The purpose of this chapter is to provide information enabling quick identification of suitable aerial photographic coverage if it exists, and guidance on where to go for help with the analysis. In addition, a brief summary of the results of the aerial photographic analysis for the Honduras and Liberia cases is presented.

#### 1) Where To Obtain the Photography

Except for a number of South American countries, there is no systematic inventory of aerial photographic coverage for the LDCs. The South American inventory is a continuation of a World Bank-initiated program started in the sixties, culminating in an Annotated Index of Aerial Photographic Coverage and Mapping of Topography and Natural Resources (1965). Nine of the nineteen original South American countries are updating their indexes, and 4 of these may be found in the Madison Building of the Library of Congress, Room B-01. The call number for the Annotated Index is G1541.BSP3. The call numbers of the four updates are Z6027.C67.M37 (Columbia, 1976), Z6027.C83.E43 (Costa Rica, 1977), Z6027.H6.G7 (Honduras, 1977), and Z6027.P17.C37 (Panama, 1978). Copies of all the updates may also be viewed but not checked out in Mr. Hal McLean's office, Room 6845 of the Main State Department building (Tel: 632-6895). These indexes greatly facilitate finding aerial photo coverage of a road's zone of influence. For each of the South American countries a simple map is presented outlining the areas of coverage. There are also particulars on the type of photography (color, black and white, the scale), the year it was taken and the name and address of the firm taking it, and where copies may be ordered. After identifying the source, some time may be required to obtain the photography.

For countries outside South America the identification of suitable coverage is more difficult. If coverage is available, it can usually be identified within a few days. If the impact evaluation team has sufficient budget available, locating the photography can be assigned to one of the consulting firms listed in Table 1. These companies will conduct an intensive search by going



through their private files, checking the many other companies engaged in aerial survey work (see Table 2 for a partial list), and contracts with foreign governments. The companies charge on a time and materials basis, but for our small jobs the search does not warrant much more than five days work. The cost of the search is not likely to exceed \$500.

Another useful source in the Washington area is the Defense Intelligence Agency (DIA). Their inventory is computerized and is fairly complete, though it is limited mostly to photography taken by the Defense Mapping Agency (DMA). Much of the photography taken by private firms, such as the 1980 coverage of Liberia, is not in the computerized files of the DIA.

The best way to check the DIA source is to send them a map that includes the standard geographic coordinates, marked by shading and with the area and years of coverage desired. Address the request to:

Defense Intelligence Agency  
Attn: Mr. Samuel Macensky, RTS-3B  
Washington, D.C. 20301

Processing the application and getting the photos delivered normally takes three to four weeks, though the DIA is quite cooperative in expediting the request if the need is urgent. One can call Mr. Macensky at 202-695-9482 to explore the possibility of expedited service. There is no charge for the DIA photos.

Because the DIA inventory is not complete, one must conduct a separate search by calling the companies listed in Table 2. This is a partial list of aerial survey companies that have flown missions in the LDCs. Such firms are usually quite helpful in steering one to a possible source for the photography. Since these companies work for clients such as the Liberian Forest Development Authority, they will only release the photography with approval from their client. This may require additional, time-consuming paperwork since most clients are overseas. The process can be speeded up considerably by soliciting the help of the local AID mission. For the Liberian case, for example, permission had to be requested from the Liberian Forest Development Authority. With the active assistance of the Liberian AID mission, this permission was obtained in two weeks, and the aerial survey company, Mark Hurd, delivered the copies four weeks later.

The Liberian case is an example of the shortest possible time required for identifying and procuring both the ex ante and ex post photography. The ex ante photography was easily available at the DIA and was supplied free of charge less than three weeks after it was requested. The ex post photography was located at the Mark Hurd company and was in hand four weeks later. In general, one should anticipate up to two months between the start of the search and receipt of both ex ante and ex post photography. The search should start immediately after the country and the roads are identified, and even before the members of the impact evaluation team are designated.

## 2) Analysis of Aerial Photography

With the use of simple tools, such as a light table and magnifying glass, even a casual observer may observe significant changes in land use, urban structure, and agricultural activity from the before and after photography. The impact evaluation team should have an opportunity to study the photographs prior to departure for the field. Such study may reveal areas of interest in the road's zone of influence that the team may wish to visit during its field survey.

Quantification of the changes observed in the aerial photographs is too difficult and time consuming for the amateur, and should be left to firms that have the appropriate equipment and expertise for such specialized work. Addresses and names of firms may be found in the Journal of the American Society of Photogrammetry.

To keep within cost and time constraints, it is best to limit the photo-analysis to one or two selected sites. Even though the job is small, significant information can be derived from such small-scale analysis. For Honduras, for example, changes in the zone of influence along only 8 km of road were analyzed. The aerial photography was of good quality and the photos contained prominent landmarks (a large river and two cities) that made orientation easy. As a result, only a few days were required to do the analysis and prepare a report, and the cost was below \$500. The Liberia analysis was somewhat larger: 33 km of road, the region around a large village, and a control zone. The analysis was complicated by the poor quality ex ante photography, the rather large scale of the ex post photography, and the absence of prominent landmarks making orientation time consuming. The Liberia effort therefore required about six man-weeks of analysis time.

To keep within time and cost limits, the analysis should be simple. Typical tasks include:

1. Analysis of changes in size of villages along the roads, for example, by counting the number of huts on a sample basis
2. Assessing improvements in the quality of huts and other structures, such as the addition of a tin roof
3. Estimating changes in the size of cultivated areas along the roads and changes in land use (percentage devoted to forest, brush, pasture, cropland, urban, plantations)
4. If possible, identification of the type of crops grown on large fields
5. Investigation of the above factors in a control road or region, i.e., along a non-improved but otherwise comparable road or in a region without improved roads so that net changes due to the road can be calculated

### 3) Analysis of the Honduras and Liberia Aerial Photography

Both case studies were attempts to demonstrate the usefulness of aerial photography as a tool in rural road impact evaluations. They were undertaken with a minimum of advance planning, which was unfortunate since the results were not available until after the teams returned from the field. They were undertaken on a low budget, so only a very small sample of the roads in the two projects could be analyzed. Nevertheless, the case studies demonstrated the feasibility and value of aerial photography as a cost-effective tool for impact evaluations.

If the results are available prior to the departure of the impact evaluation team for the field, the aerial photography analysis can provide significant guidance to the team and will greatly enhance its efficiency. The team can preview changes in agricultural patterns and urban structure, and can plan its itinerary to cover the areas of most interest. Aerial photography by itself might also be a cost-effective tool to monitor the impact of road projects.

#### Honduras

The Saba-Tocoa-Corocito Secondary road was constructed in 1973 and leads through a broad, fertile valley of the Aguan River in northern Honduras. In 1954, when the first set of photos was taken, the area was sparsely settled, sustained a subsistence economy, and was connected with the rest of the country only by a small airport. In 1973 the secondary road was completed linking the region with the outside.

The analysis compared the photos taken in 1954 with those taken in 1980 of an area about 12 miles square, containing two small towns (Tocoa and Zamora) and about five to six km of road. The photography was black and white at a scale of 1:45,000.

Based on these photos, the two towns and their surroundings grew dramatically in area and population between 1954 and 1980. The population of Tocoa grew at a compound annual rate of 9.5 percent and Zamora at 12.5 percent. Significant improvements were observed in the quality of pastures and crop land, and much of the pasture and brush land was converted to oil palm groves owned by cooperatives. Extensive clearing of forest land for converting to crop and pasture lands was also observed. In general, the landscape changed from a predominantly forested valley and shifting and subsistence agriculture to a planned and managed agricultural valley based on commercial oil palm groves, livestock, and expanded crop cultivation. Small settlements became towns with infrastructure to support the regional developments and increased population.

The aerial photo analysis was useful in describing and quantifying the dramatic changes that followed the construction of the road. Since no comparable changes in control areas were estimated, the aerial photo analysis could not indicate a causal relationship between the road project and the observed

changes. From their field surveys and interviews, however, the impact evaluation team concluded that the road played a major role in the dramatic changes observed in the aerial photography analysis.

### Liberia

The secondary road from Sagleipie to Kahmple in Eastern Liberia was constructed in 1978. It is a new road replacing footpaths and animal tracks and leads through a densely forested and rolling area crossed by small streams.

In 1970, when the first set of aerial photos was taken, the area was sparsely settled and sustained only slash and burn cultivation. The region was totally isolated from the rest of the country.

The area covers about 242 square miles and contains 33 km of road, seven villages with more than 100 huts, and a number of smaller villages. The analysis compared sets of aerial photographs from 1970 and 1980.

The aerial photography was only ten years apart, and the road was completed in 1978, only two years before the final set of aerial photos was taken. Furthermore, as based on the ground survey, complementary services such as agricultural extension were minimal. Therefore, it was unlikely that much change could be observed from the air. Nevertheless, the difference in growth was remarkable between villages located along the new road and those located in an otherwise comparable control area 20 km from the new road. Along the new road the increase in huts was 22 percent; in the control area the increase was only 5.6 percent. The net difference represented the growth component contributed by the new road, 16 percent. The observed higher population growth along the secondary road was consistent with the higher traffic counts measured by the ground survey team.

It was possible to determine the proportion of huts in each village with a zinc rather than a thatch roof. This was significant because a zinc roof is quite expensive, almost equal to the annual wages of an agricultural worker, and a high proportion of zinc roofs in a village was an indicator of an increase in income. In 1970 there were practically no zinc roofs in either the project or control area. By 1980, however, the villages along the new road had 3 percent zinc roofs. There was no change in the control area from 1970.

As expected, the short interval between road completion and the ex post photos, and lack of complementary services precluded significant changes in agriculture. The ground survey did notice a trend from subsistence cropping to cash cropping, but this type of change could not be readily observed from aerial photos. The agricultural patterns in 1980 were still irregular, with all cultivation on a patchwork of small fields in once burnt-over, wooded areas. Under those conditions, both the subsistence and the cash crops presented a similar photographic image. There was as yet no indication of a trend towards large fields with permanently cultivated export crops. Such fields, such as the palm oil plantations in Honduras, can easily be recognized by their linear man-made patterns and permanent irrigation, and would have been recognized from the photography.

## APPENDIX F

### REVIEW OF THE RURAL ROADS EVALUATION CONFERENCE AND THE PROCESS LEADING TO IT

(These are the comments of Ian Temple Roberts, Senior Consultant, The Coverdale Organization, which assisted PPC in the management of the process.)

Between November 1979 and November 1980 a large number of people participated in a series of impact evaluations and a conference to draw general lessons from AID's experience in rural road activities. AID and its Office of Evaluation undertook the impact evaluations and the conference to show that individuals and large organizations such as AID can improve the way work is done. This is in line with a growing body of practical evidence that individuals, teams, and organizations can both improve the technical quality of the work carried out and raise the satisfaction of those involved.

#### THE ACTION

In September 1979, AID Administrator Douglas J. Bennet, Jr. decided to initiate a series of impact evaluations under the supervision of PPC. Rural roads was one of six sectors included. Each evaluation team was to include as many AID direct-hire employees as possible, be interdisciplinary, and have no vested interest in the projects evaluated. Each team was to spend two to four weeks in the host country interviewing project beneficiaries and making judgments about the results of the projects. Representatives of the host government usually participated in each evaluation.

Within six weeks of returning to Washington each team was to produce a 15-page, single-spaced report, with technical annexes if appropriate. Although the primary audience was the AID Administrator and his staff, the reports were also intended for AID project designers and mission directors, Congressional committees with foreign aid jurisdiction, host governments, and academics in the field of rural road construction and evaluation. The Administrator wished the reports to be brief, readable, interesting, and usable. Eight rural road impact evaluation teams visited 14 rural road projects in 8 countries by September 1980.

After PPC had scheduled the rural road evaluations in May 1980, it also began planning a summary paper and a Rural Roads Evaluation Conference to develop general lessons and act on them. The sector coordinator for rural roads evaluations, G. William Anderson, began working with Charles Vandervoort, a transport economist from the US Department of Transportation (DOT) and others to write the summary paper and plan the evaluation conference. Anderson requested suggestions from knowledgeable persons in AID and outside experts on the outline of the summary paper, the organization of the rural roads evaluation conference, and a draft of the summary paper. With the help of outside

of the conference. From these sessions, a set of major issues emerged. Nine conference working groups were organized with team leaders from AID/W and two to three other members. Each working group was to include at least one member of a rural road impact evaluation team and one person from a host government or AID mission.

The Rural Roads Evaluation Conference met from Tuesday, November 11 through Friday, November 14, 1980. Participants worked in working groups and plenary sessions. They also heard informal presentations by developing country representatives, AID missions, and academic experts on various aspects of rural road construction, maintenance, and socio-economic impact. On Friday, November 14, the AID Deputy Administrator chaired a closing session in which major recommendations were presented and discussed by the working group leaders.

Actions resulting from the conference included the formation of a Working Group on Transport and Rural Roads to carry forward the major lessons learned, the preparation of a Policy Determination on rural road and transport activities, and the preparation of a summary report on the rural road impact evaluation findings, of which this analysis is a part.

#### THE MANAGEMENT OF THE ACTION

In general, the rural road impact evaluations and conference seem to have been a success. The 59 conference participants who returned evaluation forms on the conference (see page F-5) indicated a substantial level of satisfaction with the process and an intent to act on the ideas developed. What is important is to analyze some of the reasons for the initial success of this effort. We use the words "initial success" because unless the major lessons are used to improve future rural road activities, the evaluation effort will have achieved little.

Much of the initial success of this evaluation effort stems from the dynamic style in which AID's Administrator, PPC, and the impact evaluation teams undertook their tasks. The quality of the work spurred the conference participants to serious efforts. The Administrator initiated the impact evaluations, allocated funding from the operating expense account, debriefed each evaluation team after its return, and commented on each report. The visibility of the enterprise encouraged the participation of the agency's best talent. PPC organized innovative preparatory workshops for the evaluation teams and provided all project documentation so they could prepare for their fieldwork and decide on strategy before arriving in the host country.

In June 1980 Anderson began work with Vandervoort, the DOT transport economist on loan to AID, who participated in three of the rural road impact evaluations. They requested comments from a number of persons on the outline of the summary paper, the organization of the

conference, and the second draft summary paper. AID's Associate Administrator for Evaluation, Robert J. Berg, and the Studies Division Chief, Richard N. Blue, supported the concept of a participatory process for the rural roads conference in spite of the significant risks involved in such an unstructured undertaking. They also allocated the necessary time of research associates and support staff in PPC so that the necessary planning and preparation for the conference could take place. Finally, Berg and Blue allocated enough of their time so that their roles at the conference were defined and major contractual and planning decisions could be made.

The discussions with AID regional bureau representatives enabled Anderson and the other members of his team to identify 10 to 15 AID staff willing to take responsibility for the management of the conference, including acting as working group leaders. By the time the conference began, a coordinating group already existed. It met the first evening of the conference to work out remaining problems and met throughout the conference to shift meeting schedules, to suggest alternative procedures, and, on the last night, to devise major recommendations for AID rural road activities. After the final session the group reviewed the successes and difficulties of the conference and made suggestions for improving future conferences.

An important technique used for all planning, coordinating, and work during the conference was the use of flip charts to record important points made during discussions. This made possible more focused discussion during all sessions and enabled the typing of plenary session and working group discussions immediately after the meetings.

Those arriving from overseas simply chose the working groups they wished to be in with some assistance from conference managers and working group leaders. The conference managers asked them to remain in these groups for the first day. After that, they could move to other groups. The working groups had specific tasks to accomplish. On the first day they developed a more specific definition of their issue area and a tentative list of recommendations for change in AID activities. On the second day they refined their recommendations and delineated a strategy for seeing that AID acted on their recommendations. Each day they presented these ideas to the full conference in plenary sessions. On the final day (Friday, November 14), working group leaders presented their major recommendations on rural roads to AID Deputy Administrator Joseph Wheeler. Each of the recommendations was then open to discussion.

A principal reason why a majority of the participants deemed the conference a success was the participatory nature of the preparation work. All participants had several chances to make comments on the paper summarizing the evaluations and on the manner in which the conference was to be run. Often their suggestions were adopted. Although representatives of AID missions had more difficulty participating in the development of the conference, many missions provided suggestions on the issues they felt needed more or less attention and on the manner in which the conference ought to be managed.

A detailed administrative system was established by the consultants and PPC to handle logistics, travel, registration, expenses, supplies, and equipment. Two typists and one stenographer produced the working group papers and the records of plenary sessions.

Some of the "process" skills that were quite helpful in planning and preparing for the conference were the following:

- Clarifying purposes and end results as well as criteria for measuring whether these results were obtained
- Listening to identify useful comments; then supporting and developing those comments rather than simply making one's own point
- Setting priorities and deadlines and keeping to them
- Working out innovative ways to involve overseas visitors, especially host country representatives whose English was not fluent and who were not used to less structured meetings; taking the time to elicit these participants' ideas and suggestions
- Opening up agendas when existing ideas were found to be too narrow; closing down issues when debate and discussion were too diffuse. Practice of these skills insured that discussion and writing continued to move the group forward
- Making specific suggestions for what needed to be done and what could be done both in the short term and in the long term; clarifying these suggestions, their possibility or impossibility, and their timing for everyone
- Sharing ideas and information openly and often with many who were strangers
- Identifying specific benefits in broadly expressed purposes
- Being willing to modify words and actions in the common interest, for example, in devising a list of principal recommendations for the conference, even when the work being done seemed confusing and uncertain to be completed or used

The use of outside consultants was also important in the success of this enterprise. The Coverdale Organization used its management skills to advance effective thinking and performance by the conference participants. The consultants, with their technical skills in participatory conference management, were used at every stage as observers, advisers, questioners, and idea people.



IMMEDIATE REVIEW OF THE CONFERENCE

Participants were asked to evaluate their experience and the conference management. Fifty-nine of the participants responded. The respondents had fuller comments in answer to the four final questions; these need to be read in full by AID to obtain full benefit of the recommendations.

Some principal comments were the following:

1. Ensure that participants receive conference materials at least one month before coming to the Conference.
2. Allow more time (three to five days), before, during, and after the Conference for relaxation, mixing, broader discussion, and sightseeing.
3. Give conference time to consider the technical content of the main paper's findings, providing a common basis of information from which discussion can develop.
4. Give LDC and non-English-speaking participants greater opportunities to contribute: bilingual companions, translators, interpreters, non-English group work.
5. Undertake more photocopying of work as it is done to act as a personal reminder before the final report.
6. Carry out more preparation by group leaders and core groups in drafting the description of the issues the groups will work on and in coaching training leaders in group management skills (with special attention to helping quieter and minority views to be properly represented).
7. Provide more guidance on how results are to be structured.
8. Retain the mix of small plenary sessions, but add partial plenary sessions; retain openness in the final presentation of principal recommendations.
9. Retain use of specialists and host country informal presentations with slides. Give them more notice to prepare a 20-30 minute presentation.
10. Publicize the purpose of the Conference long before (at least six months) and the results long afterwards (a PR campaign).

REVIEW OF RURAL ROADS CONFERENCE  
Harpers Ferry, West Virginia, U.S.A.  
November 11-14, 1980

The principal purposes for bringing nearly 100 people together included:-

1. To put fresh thought and impetus into rural roads activities,
2. To use evaluation lessons in design and implementation,
3. To mix people and share ideas by inviting participants to choose their working group topics.

It will help in the consideration of future conferences if you would give a few minutes to respond to this review. Thank you.

TOTAL RESPONSES WERE 613 CHECKS FROM 59 PEOPLE		Please check per question					Total of NIL+A+B	Total of C+D
		A little		A lot				
		NIL	A	B	C	D		
To what extent do you think the purposes were achieved?	Purpose 1.		2	8	26	22	10	48
	Purpose 2.		4	15	24	10	19	34
	Purpose 3.			6	21	27	6	48
Did you personally find the conference worthwhile and enjoyable?	Worthwhile:			4	20	36	4	56
	Enjoyable:			9	25	23	9	48
How much do you plan to use ideas from the conference yourself, and do you know how much others are planning to use ideas from the conference?	You planning:		2	5	22	27	7	49
	Others planning:	1	2	15	21	8	18	29
How much of the conference ideas will you present to higher ranking people in your own or other organizations, and to what extent do you intend to involve these people in using such ideas?	Present:		4	9	19	24	13	43
	Involve:	1	5	15	24	11	21	35
Do you see this open and self-organizing conference suitable for AID again?...and for others?	For AID:		1	5	17	36	6	53
	For Others:		2	8	15	32	10	47
		2	22	99	234	256	123	490

On the other side, would you please add your responses to three other questions:

1. What did you like and what went successfully at the conference? Please give examples and describe the causes of these "successes."
2. What was difficult, what was less successful? Please give examples and describe the causes of these "difficulties."
3. What proposals would you offer to improve such a conference?
4. Any other comment we can use?

We appreciate your interest, which will help AID learn from your experience and comments. To let us make the most use of your responses, please give us your

NAME:

ORGANIZATION:

Thank you.

# APPENDIX G

## RURAL ROADS EVALUATION CONFERENCE

HARPERS FERRY, WEST VIRGINIA

November 11 - 14, 1980

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## APPENDIX H

### IMPROVING INCENTIVES FOR DEVELOPING AND USING EVALUATION LESSONS IN AID: BY G. WILLIAM ANDERSON

In general we need to improve personal and organizational incentives for (1) carrying out evaluations and (2) using evaluation lessons. This hits both the supply and demand side of the problem.

A. Improving Incentives/Removing Disincentives for Carrying Out Evaluations and Supplying Evaluation Lessons for Missions and Bureaus.

1. Work on PER process so that those who work on an evaluation who do well (i.e. produce quality products and usable findings) get praise in their PERs.

One possibility is to have regional bureau evaluation officers comment on PERs of mission evaluation officers so that mission evaluation officers hampered by indifference of their superiors have some reward for doing good evaluation work. Similarly, PPC/E could comment on the PERs of the regional bureau evaluation staffs to praise their good work.

2. See that those working in evaluation (in missions, bureaus, on impact evaluation teams) who do well are rewarded with good PERs, awards, promotions, better jobs, long-term training, etc.
3. Insert in Mission Directors Conferences presentations of major findings of impact evaluations in particular sectors so that Mission Directors are aware of the principal findings in rural roads, for example.
4. Insert articles in Development Digest on the principal findings in the various sectors, such as roads. This would presumably help make missions and LDC governments and individuals more aware of findings in particular sectors.
5. Do regional workshops or traveling roadshows to missions to present evaluation findings in particular sectors.
6. Develop an impact evaluation game as part of an expanded PDE course that would introduce people to the task of investigating impact, choosing sites, getting straight answers in interviews, summarizing and analyzing, and writing the report.
7. PPC/E could take one sector a year (such as livestock or rural roads) and in cooperation with regional bureau evaluation offices and project review committees, could present the principal findings from evaluations and see that these findings were taken into account in PID and PP reviews.
8. See that FSR Capital Development Officers, as well as Program Officers, rotate through jobs in regional evaluation offices and PPC/E. That would create more evaluation skills and more understanding of purposes and uses of evaluations.

9. Increase incentives for mission staff to concentrate on implementation of projects and reporting on results as well as reasons for the results. That would provide useful raw material for more in-depth evaluations on those projects.
10. Create sector working groups to channel findings of evaluations in a sector to the persons involved in design. Working groups could also figure out ways of using evaluation lessons in CDSSs, ABSs and the CPs.
11. Produce an annual review of evaluation results. Perhaps this would be the substance of a monthly evaluation newsletter.
12. Continue to use the evaluation publication program to encourage bureaus and missions to publish good evaluation reports. That would enable important findings and examples of good work to be seen throughout AID/W and field missions.
13. Determine how DS/DIU needs to be strengthened to enable it to provide synthesized evaluation findings in particular sectors to mission staff who want to know the lessons of our experience in that sector. Forward an action memorandum to the Administrator proposing the funding of the steps to strengthen DS/DIU to perform this function.

B. Improving Incentives/Removing Disincentives for Using Evaluation Lessons.

1. Pick a limited number of targets--sectors or countries--where our evaluation findings clearly indicate more or fewer funds should go to these types of projects or these particular countries.

Seek to intervene in budget decisions (at CDSSs, ABS levels; or with sectors in project reviews at PID stage) to reduce or increase the funds allocated; preferably try to do both with different targets so both positive and negative signals are given.

Only by connecting evaluation findings to budget decisions on types of projects or overall country programs will AID employees and organizational entities see that evaluation findings affect funding levels. Once they see that, there will be much more incentive to use evaluation findings.

2. Determine a suitable reward for the bureau or mission most helpful in the impact evaluation exercise--more funds, more staff, more office equipment, more of something they want. Make clear that they are getting this because of their cooperation in the impact evaluation exercise.

3. Identify individuals (or missions) who use evaluation findings well to improve projects and programs. Reward the individuals with good PERs, awards, merit pay increases, better jobs, promotions, other recognition, long-term training (if they want that), etc.
  4. In each sector where there is a pulling together of findings through conferences or meetings, spend a significant amount of time on developing a plan for utilization of those evaluation lessons. Get participants to think creatively on how to improve incentives for using evaluation lessons in that sector. Set up incentives for using evaluation lessons in that sector. Set up working groups or other bodies to carry through on findings.
  5. PPC/E could schedule annually one or two surprise reviews to see how well evaluation lessons are being utilized in project designs (PIDs and PPs), CDSSs, ABSs, CPs. Reward the bureau and mission doing the best job with something they want--more funds, more staff, more office equipment.
  6. Establish requirements that evaluation findings be specifically referenced and responded to in CDSSs, ABSs, and CPs.
  7. Establish with PPC/PDPR how future policy determinations and policy papers will take evaluation findings into account so that policy is based more on experience.
  8. Couple presentation of evaluation findings to field staff with site visits (to the Kenya labor-based road construction program, for example) so that staff can see how the good programs are working (and how the bad projects are not working).
  9. Establish a system for presenting evaluation findings in sectors to design teams before they go out to develop the project design. Include role playing and games that require each member of the team to confront the evaluation findings that apply to all of the team members, not just the findings that apply only to each of them.
  10. Develop a career corps of evaluators and a way of their rising to Mission Director jobs and other top jobs in AID. At the same time, see that evaluators take over jobs--such as Program Officer and Capital Development Officer positions.
-

APPENDIX I

AID Administrator Memorandum on Project Impact Evaluation

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
WASHINGTON, D.C. 20523

APPENDIX I

THE ADMINISTRATOR

October 24, 1979

MEMORANDUM FOR THE EXECUTIVE STAFF

SUBJECT: Project Impact Evaluation

I attach high priority to establishing an ex post facto project evaluation process that will:

- furnish information we need for designing future projects;
- enhance policy and program planning;
- encourage project managers to get lasting results; and
- contribute to training and broadening AID staff.

Rather than relying on massive, expensive, in-depth, academic studies performed by outside specialists, I want to build an in-house capacity to evaluate our work on a regular basis and to produce simple reports which will be of use primarily to us, but also to our host countries, the larger development community, and the Congress.

As the first step in establishing a continuing system for project impact evaluation, 20-30 projects will be evaluated for impact over the next 12 months, with as many as feasible being completed in the early part of that period. These evaluations will be concentrated in a few representative sectors, using comparable scopes to ensure cumulative results, and concluding with a summary evaluation for the sector.

The success of this effort will depend on the people involved. Evaluation team leaders will be selected from among the Agency's top talent. Teams will consist of approximately 3 members each representative of different disciplines and regional backgrounds. While comprised mostly of AID direct-hire staff, drawn on an Agency-wide basis, the teams should, where desirable, include host country and outside contract professionals. Team leaders will be assigned to projects that are generally outside their own regional bureaus to ensure both the fact and appearance of objectivity. Membership on an evaluation team should



provide a stimulating opportunity for learning and for career development.

The projects to be evaluated will be those that have terminated during the previous 12-18 months or where substantial portions of the activity have been completed. Evaluations will generally require 2-3 weeks or less in the host country, with perhaps an additional week for preparation and completion of the report. All evaluations must be written in clear, concise, simple language to enhance the chances that they will be used. Maximum length should be about 15 pages, with such annexes as necessary for purpose of illustration. Photos are welcome. Anecdotal beneficiary reactions should be included where appropriate to give a sense of local community feelings with respect to impact.

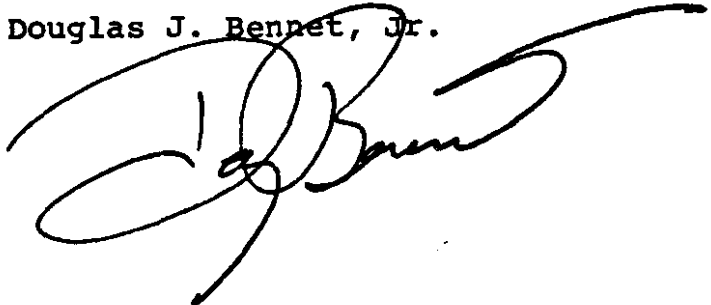
Evaluations must report on impact, as opposed to simply reporting effectiveness or success in delivering inputs. While baseline data will not be available for most projects, we assume that the best people in AID, even in the absence of sophisticated statistics, can report sound and useful impressions. We must be prepared to realize that this exercise will not yield scientifically precise (or even consistent) results, but I believe it will offer us much that is useful.

The bureaus have been asked to identify potential team leaders. PPC, in consultation with the bureaus, will identify projects to be evaluated. PPC will review scopes of work, prepare guidance on core issues, nominate team leaders and assemble teams with an Agency-wide perspective, and review the final reports (which I will then read). PPC will also provide appropriate, concise evaluation orientation and collect all necessary background materials for each evaluation. The other concerned bureaus will each identify a special coordinator and assist in selecting projects, preparing background materials, and insuring mission and field support.

I recognize that over and beyond this process, individual regions and missions will continue to conduct a variety of evaluations of different types for their own internal management purposes. To ensure that we have one central information point for AID evaluations, all Agency evaluation plans and completed reports should be shared with PPC, even in cases where coordination is being provided elsewhere.

In concluding, I want to emphasize my commitment to an on-going, objective, intellectually stimulating evaluation process that can help those of us who participate in it and those of us who must make decisions based on its results. This need not be just another bureaucratic exercise; it can help us get to the heart of what AID can do for the countries and peoples with whom we work. I look forward to your wholehearted cooperation and to being personally involved as we proceed.

Douglas J. Bennet, Jr.

A handwritten signature in black ink, appearing to read 'D. J. Bennet', with a large, sweeping flourish extending from the end of the signature.

## APPENDIX J

### Plenary Sessions from the Rural Roads Evaluation Conference

#### 1. Opening Session (November 12, 1980; 9:00 a.m.)

The Conference opened with welcomes and a message from AID Administrator Douglas J. Bennet, Jr.

I particularly regret that a meeting of the North South Round Table in Ottawa prevents my attending the final session of your conference to hear your recommendations. However, I have asked Joe Wheeler to hear your conclusions and to comment on them.

Most of you know my deep commitment to the impact evaluation process. I have met with many of you who participated on impact evaluation teams, both in your preparatory workshops and to hear the results of your field work. I am particularly anxious to hear your policy recommendations so that our longer term actions are as informed as possible from our actual experience. I am also anxious to learn how AID can better perform to carry out our current and new rural roads activities to have the maximum beneficial impact on the greatest number of the poor.

You haven't much time to cover an impressive amount of material. I await your recommendations and so does AID's senior staff.

You have my very best wishes.

Robert Berg, Director of the Office of Evaluation, then spoke about the state of rural roads programs today. He emphasized the need to evaluate the work that has been done, is being done, and the work to be done. Never before has AID looked so carefully at the implications of its work. He spoke of the need to reinforce the things that are going well and the need to re-think the things that are not effective.

Mr. Berg stated that this conference was of an experimental nature and that the results will be closely watched by policy makers in the US and in developing countries and by the US Congress. This was one of the few post-New Directions efforts to help weigh the results of the social legislation to see if better ways can be found to maximize the good and minimize the harm of development interventions. It was thought that the Congressional reaction would be sympathetic and supportive.

2. First Working Session (November 12, 1980; 4:00 p.m.)

After the day of working group sessions, the participants reassembled to share their progress. Maintenance was a recurrent topic receiving lively attention. Although everyone agreed that maintenance was essential, there were considerable differences on its relative priority to new construction in terms of economic and political results. How long the road will last, its particular circumstances, who will benefit, and where the money comes from were all considered to be significant factors in terms of the priority of maintenance over new construction.

This discussion brought up the issue of economic analysis. Steven Carapetis pointed out that a road without maintenance will not last 20 years, no matter what the economic analysis says. Melody Mason said that the economic analysis should not focus on optimal maintenance but on what is likely.

John Howe made three points:

a. Efforts to improve road evaluation and design procedures lead to more complex and expensive methods of appraisal. Currently, design and appraisal costs are often 20 percent of total project costs. Any increase in this proportion is likely to lead to increased resentment, and possibly resistance, by recipient countries toward what they see as unnecessarily expensive appraisal procedures imposed from, and usually conducted by, people from outside their country. The essential question therefore is how to make design and appraisal procedures better without making them more expensive.

b. A current weakness of road appraisal procedures, with the emphasis on "economic" benefits, is that insufficient recognition is given to the very different states of network development in different developing countries. Countries such as Botswana, Liberia, and Nepal do not yet have a basic network of roads connecting the capital to the major regions of their countries or often to their international neighbors. In this situation the political imperative to build roads is likely to be seen by those countries as paramount, irrespective of benefits in a strictly economic sense. "How can we bring such cases within the lending rules of AID or other similar institutions?"

c. Economic analysis of road projects rarely includes any assessment of the value of time saved to road users, vehicles, or the goods carried. The general justification for this is that the marginal product of labor is close to zero; therefore, time should not be valued. This argument is too simplistic since it

-- ignores the evidence of what people do. Numerous examples can be found of their willingness to pay substantial sums of money to save time.

-- confuses the population-at-large with the road user population. Interview surveys show them to be very different. Travelers by definition must be part of the exchange economy since they are able to pay cash for fares or goods transport.

-- does not recognize the potential importance of time savings in evaluations. In Western countries they frequently comprise 70 to 80 percent of total scheme benefits. To exclude them is therefore not likely to exclude a marginal consideration.

The question can therefore be asked, "Why should we continue to exclude time savings from rural road evaluations?"

This raised the question of "What is a new road?" since there was almost always some sort of trail preceding any road. G. William Anderson defined "new road" as being at the stage of shifting from carrying non-motorized transport to motorized transport. Gordon Appleby felt that the completely deteriorated "old" roads also include the shift from non-motorized to motorized transport.

In counterpoint, Larry Minear read the evaluations as being fairly negative. He felt that one could recommend upgrading instead of building new roads as a way of slowing change.

### 3. Second Working Session (November 13, 1980; 3:30 p.m.)

After another day of working group sessions, the participants again met in plenary. Each group presented its findings on its issue area. Richard Blue drew several themes from the presentation. One of the major problems with doing high-quality analysis in AID is the limited number of good, well-trained people able to do the rigorous, well-thought-out analysis required. The objectives of AID involvement received considerable attention and there seemed to be a consensus on the need for a transport policy.

Another issue raised during the discussion focused on the appropriateness of the type of road or track to the type of transport and the kind of access required. Upgraded animal tracks and bike trails were suggested as possibilities to be explored by the transport working group.

Robert Berg reiterated the need to show that lack of access is a constraint to the improvement of those in the rural area. Richard Rhoda pointed out that access can help or harm the rural poor; therefore, there is a need to think of the constraints faced by the target group and what other impacts the road may have.

This brought up how to improve the design process and how to shorten it. One option suggested was replicating projects that had proven themselves. John Zedalis said that AID's policy of shifting people around the world necessitated a central memory to share potentially replicable projects. Because the present Agency memory is not well enough organized, it was suggested that centralizing personnel in Washington and sending them out from there might help create a sharable body of knowledge. But it was argued that each country and project area is unique and requires specific knowledge. It was suggested that a functionally organized technical office where people could specialize should support missions and provide better technical information.

The next issue to be raised was what can AID do with respect to equity when it must work with existing government institutions? Piers Blaikie suggested working with those individuals in the government who are interested in equity. Jose Colon, a member of the Colombia impact evaluation team, said that in Colombia the agency in the government was not interested in equity, but the team successfully got to those individuals who were. It was concluded that given the right conditions, one can build rural roads and improve equity. But improving equity in the short run may not be the best means of achieving equity in the long run.

#### 4. Final Session (November 14, 1980; 10:00 a.m.)

On the final day of the conference, the working groups presented their conclusions and recommendations for action to Joseph Wheeler, AID's Deputy Administrator. Robert Berg summed up the key recommendations on the main steps AID should take and how to accomplish these recommendations.

##### a. What Should AID Do in the Transport Sector?

##### Policy

AID transport projects should be derived from analysis of means of access and modes of transportation as they relate to food production and rural development.

Where access or transport is a common constraint to rural development and food production, AID should examine the whole transport sector. Where access is one of several problems affecting rural food production and development, rural roads and other transport may be an appropriate component of integrated projects.

Roads and related transport activities may not need to be supported by AID in order to foster food production and rural development, but transport projects ought to be submitted where necessary.

##### Integration

The question of access should be raised at the CDSS level, at the national transport sector level, and at the level of institutional support rather than on a road-by-road basis.

### Complementary Services

To ensure maximum benefits, projects should ensure that complementary inputs be available already or be provided in the project. In the absence of in-place or planned inputs, roads are necessary but not sufficient. Considerable evidence was presented on this point in the evaluations, particularly for Kenya, Honduras II, Thailand, and the Philippines.

### Equity

Equity must be actively promoted. It will not take care of itself. AID should not support rural roads unless analysis shows that benefits are likely to be distributed in favor of specifically identified low-income groups. Sometimes the benefits can be directed to these groups through certain policies, such as measures to secure land tenure for small farmers. In cases where government programs strongly favor lower income groups, a transport project justified on the basis of increasing production may be acceptable. AID should work with persons and institutions in host countries who are sympathetic to these aims.

Equity should be a part of economic analysis by establishing priorities of social costs and benefits, including the distribution of benefits among income groups. This analysis should be undertaken prior to the PID.

The evidence on equity was broad, but the performance was mixed. With the exception of Thailand, the newer projects had more equitable impact. Evidence showed that there was not a great deal of benefit for women other than mobility. Six studies stressed the importance of equity, but only three reported that efforts had been made to promote equity: Colombia, Kenya, and Sierra Leone.

### Maintenance

Maintenance is a major concern. Ensuring proper maintenance should be an important concern of project analysis and often a component of project design. Maintenance costs throughout the estimated life of a road should be an integral component of total project costs. AID should be prepared to consider financing maintenance costs contingent on a country's own maintenance efforts.

Only Thailand showed sustained maintenance. Others reported major maintenance problems. There were high losses due to lack of maintenance because the cost to reconstruct is higher. Some points to note:

- Lack of maintenance should be seen as a problem concerning many sectors.
- To reinforce national authorities by financing new construction seems to work against institutional incentives for maintenance.
- In addressing the maintenance question, action needs to be taken with other donors.

b. How Does AID Implement These Changes in Transport Projects?

Policy Determination

AID should issue a policy determination on the transport sector and promptly communicate it to missions.

Early Consideration of Transport Industry

For particular projects there should be an assessment of transport needs prior to the PID, including attention to non-motorized means of transport.

In-House Capability

AID should strengthen its in-house capability in rural road project preparation, including more staff. (You can't do more with less, just less and less and less.) AID staff should be supplied with state-of-the-art methods for economic analysis of rural roads projects, including methods for rapid appraisal.

The impact evaluations showed a number of AID's institutional problems, particularly project design. In both Sierra Leone and Liberia there were several land tenure problems not identified at the design stage. AID has to look at overly optimistic estimates of objectives and benefits. Training is needed to share and expand knowledge. An important theme from Robert Chambers' evening session was that if one has more knowledge, one can do better design work--both more accurately and more rapidly.

Interdisciplinary Teams

Because of the need to consider key issues in the project design, all team members should be involved in all major aspects of design. There must be special emphasis on identifying the beneficiaries and the social impact.

Rural Roads Working Group

There should be follow-up in AID to a number of the ideas coming out of the conference, but there is no office in the Agency that looks at all these issues. There is a need for a recognized working group on rural roads to monitor and assist the follow-through of these and future recommendations.



### Using Evaluation Lessons

AID should ensure the timeliness, validity, and accessibility of evaluation lessons in transport and create personal and organizational incentives for using evaluation lessons.

The question of evaluation arose from the non-use of evaluation--how it fell into the case studies. Jamaica: AID and government missed nine evaluation opportunities--projects failed. Kenya: rural access roads are better from having looked at previous efforts. Liberia: Phase 3 is not being done partly because of examination of difficulties found in Phases 1 and 2. It is good to see that there is follow-through, that good interventions are being made, and that poor projects are being reconsidered. There is a concern that lessons of evaluation be sought and heeded in the Agency, even when top administrators are not personally involved in the process.

Mr. Berg then went on to give some of his personal observations. First, impact evaluations showed major inaccuracies in the cost of projects and the time it took to complete them. This leads to small projects and longer implementation. Although other donors have the same problems, this is not an excuse to sit back. There is a need for more realism in project design despite AID's incentives against candor.

Mr. Berg said he thinks we are learning to do New Directions projects. The problem projects seem to be the older projects. The newer ones are harder to do (Liberia, Sierra Leone, Philippines) but seem to be moving better.

He reviewed the evidence on whether rural roads help people and are part of a shift of resources towards the poor. Piers Blaikie's evening presentation on Nepal showed that the roads had an adverse effect. In Jamaica they were not helpful or harmful. No dramatic shift occurred in Thailand, but part of the general shift was in the right direction. Some Sierra Leone roads were helpful; some were not. In Colombia they were very helpful. As a participant said, "Roads are a blunt instrument to help the poor and must be used correctly."

Mr. Berg presented a scorecard on whether the eight projects studied were successful:

- Sierra Leone--some problems but successful
- Colombia--very successful
- Liberia--mixed results
- Jamaica--not successful
- Philippines--somewhat successful
- Thailand--successful
- Honduras--older project unsuccessful, newer project successful
- Kenya--no significant impact yet

We have to recognize the need to find out a good deal more on why those projects that worked did work. We need to accent the positive.

To answer the question of whether we should do more roads projects or less, Mr. Berg related this story.

There was a senior anthropologist in India giving a presentation. At the end a hand went up and a student asked, "Professor, is caste a good thing?"

The Professor said, "That is a very interesting question. Gandhi was once asked the same question and I am not sure he ever answered it." He then turned to sit down.

"But Professor," said the student. "you didn't answer the question."

The Professor turned back and said, "Gandhi was a very wise man."

After Mr. Berg's remarks, the working groups summarized their reports, which were presented above in Section IIIA. The first part of the discussion that followed centered on the objective of building roads and what benefits were intended from them. It was agreed that the benefits derived from the roads should not be limited to food production and related benefits. Mr. Wheeler said that the issue was crucial. We are right in planning individual road project components over a relatively short time period, but wrong when we assume that should be the end of activity. Using a period of 10-20 years, we could plan an activity over several stages. We also need to institutionalize a system for carrying out and paying for maintenance.

The working group on Transport Policy reported. Helen Soos commented that we should encourage small businesses as a way of dealing with the lack of competition in the transport industry. The appropriateness of the roads and the vehicles to their setting was also stressed. John Howe said he has attended 30 rural roads conferences in 16 countries but never one on rural vehicles. To the poor, a motor vehicle is like a moon rocket and simpler, cheaper alternatives should be considered.

In presenting ideas on more interdisciplinary teams, Charles Vandervoort stressed the need for all team members to see other members' points of view.

Robert Chambers suggested using the findings of the evaluations to make a simulation game to help design team members understand other perspectives. Emmy Simmons said that the same kind of interchange among people at the conference was the same kind needed at the field level. Joel Cotton suggested that regional design offices might help overcome the constraints of small missions. From the working group focusing on the use of evaluations, Ray Roan said that the consensus was that AID does not use evaluation findings. The Agency needs to provide incentives for using evaluation findings and to make sure they are accessible to all designers, planners, and policy-makers. Hunt Howell said that too many evaluations have been done for self-serving purposes. Paul O'Farrell agreed and went on to say that missions know who they can get to evaluate a project to come up with the answer they want. For that reason, it is important to have outside teams come in and look at projects as the rural road impact evaluation teams had done. As a project officer, he found this conference very useful for his future design work in rural road projects. Having gone over eight or so cases gives a much better grip on the state-of-the-art in this area.

Richard Rhoda presented the report on equity. He said that we tend to lose sight of impact, and that equity is a very big part of impact. Larry Minear said that if rural roads cannot move toward the redistribution of assets, then we should not do rural road projects. Robert Chambers added that the issues of equity are too important to be left to the social scientist; project designers from all disciplines should ask who will benefit.

In his concluding remarks, Mr. Wheeler said that we need more interdisciplinary dialogue. It is AID's role to carry on a development dialogue, and that dialogue starts with ourselves. It becomes important when we get into the dialogue with the host countries. If a government is going to invest money, that means a process in which the Ministry of Roads is required to talk to the Ministry of Planning and other ministries to discuss the various issues. If this can be institutionalized, the process will be effective, not just for the project at hand but for years to come.

Although the Congressional mandate to work with the poor seemed to constrain AID's efforts in transport, we actually found that when roads projects were supportive of Congress' objectives, they were eventually approved. We need to keep our attention focused on the need to affect the lives of people in LDCs who have not achieved an adequate standard of living. We need to be very careful about location, selection, the quality of road building, and local participation.

He said that we have made enormous progress in the right direction here. This type of conference is educational to us all. The job ahead is to apply the lessons from this conference in development around the world.

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